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ESTIMATION OF THE OPERATING CHARACTERISTICS OF ITEM RESPONSE CATEGORIES VII: BIVARIATE P.D.F. APPROACH WITH NORMAL APPROACH METHOD

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ESTIMATION OF THE OPERATING CHARACTERISTICS OF ITEM RESPONSE CATEGORIES VII: BIVARIATE P.D.F. APPROACH WITH NORMAL APPROACH METHOD

ABSTRACT

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The research was conducted at the principal investigator's laboratory, 409 Austin Peay Hall, Department of Psychology, University of Tennessee, Knoxville, Tennessee. Those who worked for her as assistants at various times include Yeh Ching-Chuan, Robert L. Trestman, Philip S. Livingston and Paul S. Changas.

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I Introduction

There have been produced many approaches and methods for estimating the operating characteristics of the item response categories in the present research project, and we can summarize them as follows.

(1) Different Approaches:

- (i) Histogram Ratio Approach
- (ii) Curve Fitting Approach
- (iii) Conditional P.D.F. Approach
  - (a) Simple Sum Procedure
  - (b) Weighted Sum Procedure
  - (c) Proportioned Sum Procedure

(2) Different Methods:

- (i) Two-Parameter Beta Method
- (ii) Pearson System Method
- (iii) Normal Approach Method

These methods and approaches, with the results of simulation studies, have been reported in the six technical reports, which are listed in References as [1] through [6] at the end of this technical report. Each combination of a method and an approach has its relatively strong and weak points in comparison with the other combinations, and which one of these combinations should be adopted in a particular situation depends upon many factors involved in it. There are some essential points which are common in these combinations, however, and they can be summarized as follows.

[A] The estimation of the operating characteristics of the item response categories, and that of the ability distribution, are conducted without assuming any prior mathematical form.

[B] A relatively small number of subjects can be used in the entire process of estimation.

There have been very few theories and methods developed for estimating the operating characteristics of the item response categories without assuming any prior mathematical form. Most of the research conducted so far in this area is concerned with the estimation of the item parameters of a specific model, like the normal ogive model or the three-parameter logistic model, which is assumed to fit the data in question. Not only is the usefulness of such methods limited, but there exists a strong possibility that the adoption of these methods distorts psychological reality by molding it into a specific model, which results in producing nothing but artifacts. We must say that such a research is meaningless, as well as harmful for the progress of science. (This is well exemplified by the fashionable, blind use of the three-parameter logistic model for the multiple-choice test item.) The operating characteristics of the distractors of the multiple-choice item, for example, can be approached only through methods which presume no mathematical forms for the operating characteristic of the correct answer, in the truly scientific sense of the word. This will be attempted in a separate research, and, if it becomes successful, it will lead us to an answer to the long existing question, "How can we make use of the responses to the incorrect alternative answers of the multiple-choice item?", and will enable us to estimate the examinee's ability or latent trait more efficiently.

Although certain organizations like Educational Testing Service may be able to use testing data of several hundred thousand examinees, many research projects are handled on college campuses, where it is extremely difficult to collect such a large set of data. In addition to this fact, the increasing restriction in using human subjects makes it impossible to depend upon the students' cooperation in psychological testing and experiment as we could in the past. It is a necessity, therefore, for us to investigate methods and approaches which do not require a large number of subjects, and yet possess high accuracies of estimation.

Bivariate P.D.F. Approach has been introduced in a previous paper (Samejima, 1977b), for estimating the operating characteristics of the item response categories, although the exact name has not been given. The method introduced in that paper has often been called Normal Approximation Method. It is a procedure based on the above two principles, [A] and [B], just as these combinations of a method and an approach discussed earlier. In the present paper, the combination of Bivariate P.D.F. Approach and Normal Approach Method will be introduced, and tested on the simulated data, which have been used in the preceding studies, and a brief description of which is given as Appendix I. In the following chapters, this combination will often be called Bivariate Normal Approach Method, if there is no possibility of confusion.

II Bivariate P.D.F. Approach

In this approach, we shall try to approximate the bivariate distribution of ability θ and its maximum likelihood estimate $\hat{\theta}$, for each subgroup of examinees classified with respect to their item scores for each of the ten binary items. This has been attempted earlier (Samejima, 1977b), in the Normal Approximation Method. In this paper, however, we do this in a somewhat different way.

Let λ be an estimate of ability θ, in such a relationship that

$$\lambda = \theta + \eta \quad , \qquad -\infty < \theta < \infty \quad , \tag{2.1}$$

where η is the error of estimation which, for a given θ, distributes normally, with zero and σ as the two parameters. Thus the conditional density function, $\psi(\lambda|\theta)$, of λ, given θ, is $n(\theta,\sigma)$, and we have

$$E(\lambda|\theta) = \theta \tag{2.2}$$

and

$$\mathrm{Var.}(\lambda|\theta) = \sigma^2 \quad . \tag{2.3}$$

The bivariate density function, $\xi(\lambda,\theta)$, is given by

$$\xi(\lambda,\theta) = f(\theta)\ \psi(\lambda|\theta) \quad , \tag{2.4}$$

where $f(\theta)$ is the density function of ability θ. The marginal density function, $g(\lambda)$, of λ can be written as

$$g(\lambda) = \int_{-\infty}^{\infty} \xi(\lambda,\theta)\, d\theta \quad , \tag{2.5}$$

and the conditional density function, $\phi(\theta|\lambda)$, of θ, given λ, is given by

$$(2.6) \qquad \phi(\theta|\lambda) = \xi(\lambda,\theta)[g(\lambda)]^{-1} .$$

We obtain for the regression of θ on λ

$$(2.7) \qquad E(\theta|\lambda) = \lambda + \sigma^2 \frac{d}{d\lambda} \log g(\lambda) ,$$

which is not necessarily linear. The conditional variance of θ, given λ, can be written as

$$(2.8) \qquad \text{Var.}(\theta|\lambda) = \sigma^4 \frac{d^2}{d\lambda^2} \log g(\lambda) + \sigma^2 ,$$

and the third and fourth conditional moments of θ about the mean, given λ, are obtained by

$$(2.9) \qquad \mu_3(\theta|\lambda) = \sigma^6[\frac{d^3}{d\lambda^3} \log g(\lambda)]$$

and

$$(2.10) \qquad \mu_4(\theta|\lambda) = \sigma^4[3 + 6\sigma^2\{\frac{d^2}{d\lambda^2} \log g(\lambda)\} + 3\sigma^4\{\frac{d^2}{d\lambda^2} \log g(\lambda)\}^2 + \sigma^4\{\frac{d^4}{d\lambda^4} \log g(\lambda)\}] ,$$

respectively.

When the density function, $g(\lambda)$, is not observable, $E(\theta|\lambda)$ can be approximated by the linear regression, or the best fitted linear function of λ in the sense that the discrepancies of the corresponding θ from this linear function are minimized by the least squares principle. Thus the quantity Q to be minimized is given by

$$(2.11) \qquad Q = E[\theta - h(\lambda)]^2 ,$$

where $h(\lambda)$ is the linear function, and we obtain

$$(2.12) \quad h(\lambda) - E(\theta) = [\text{Var.}(\theta)]^{1/2} \text{ Corr.}(\theta,\lambda) \ [\lambda - E(\lambda)] \ [\text{Var.}(\lambda)]^{-1/2} ,$$

where $\text{Corr.}(\theta,\lambda)$ is the product-moment correlation coefficient of θ and λ. From (2.2) we have

$$(2.13) \quad E(\theta) = E(\lambda) ,$$

and, from (2.1) and the related fundamental assumptions, we obtain

$$(2.14) \quad \text{Var.}(\theta) = \text{Var.}(\lambda) - \sigma^2$$

and

$$(2.15) \quad \text{Cov.}(\theta,\lambda) = \text{Var.}(\theta) + \text{Cov.}(\theta,\eta) = \text{Var.}(\lambda) - \sigma^2,$$

where $\text{Cov.}(\theta,\lambda)$ denotes the covariance of θ and λ. Substituting (2.13), (2.14) and (2.15) into (2.12), we can write

$$\begin{aligned} (2.16)^* \quad h(\lambda) &= [1 - \sigma^2\{\text{Var.}(\lambda)\}^{-1}][\lambda - E(\lambda)] + E(\theta) \\ &= [1 - \sigma^2\{\text{Var.}(\lambda)\}^{-1}]\lambda + \sigma^2[\text{Var.}(\lambda)]^{-1} E(\lambda) \\ &= \beta\lambda + \alpha \ . \end{aligned}$$

When θ and λ have a bivariate normal distribution as their joint distribution, we have

$$(2.17) \quad E(\theta|\lambda) = h(\lambda) \ ,$$

---

* Note these coefficients α and β are different from those in Samejima, 1977b. Let α^* and β^* be those in Samejima, 1977b. Then we can write $\alpha = -\alpha^*$, $\beta = 1 - \beta^*$ and $h(\lambda) = (1 - \beta^*)\lambda - \alpha^*$.

and the conditional variance of θ, given λ, can be written as

$$(2.18) \quad \mathrm{Var.}(\theta|\lambda) = \sigma^2[1 - \sigma^2\{\mathrm{Var.}(\lambda)\}^{-1}] \quad .$$

By virtue of the asymptotic property of the maximum likelihood estimate, when the test information function, $I(\theta)$, is constant for the range of θ of our interest and its amount is substantially large, we can use the maximum likelihood estimate $\hat{\theta}$ for the estimate λ, with

$$(2.19) \quad \sigma^2 = [I(\theta)]^{-1}$$

(Samejima, 1975, 1977a, 1977b). Thus all the mathematical relationships developed for θ and λ so far can be applied for those of θ and $\hat{\theta}$ as an approximation, as far as the above condition for the test information function is satisfied.

III Bivariate Normal Approach Method

In the Normal Approximation Method, the bivariate distribution of θ and λ for each item score group is approximated by a bivariate normal distribution, and, using (2.17) and (2.18), the frequency distribution of θ for each item score group is estimated accordingly (Samejima, 1977b). The application of this method for the simulated data of five hundred hypothetical examinees (cf. Appendix I) turned out to be quite successful.

The assumption of the bivariate normality for the joint distribution of θ and λ can be avoided, however, if we can estimate the density function $g(\lambda)$ in an appropriate way, which enables us to estimate the regression of θ on λ directly through (2.7), and other conditional moments through (2.8), (2.9), (2.10), etc. Once this has been done, then we can approximate the conditional density, $\phi(\theta|\lambda)$, of θ, given λ, and then estimate the bivariate density function $\xi(\lambda,\theta)$ through the relationship

$$\xi(\lambda,\theta) = \phi(\theta|\lambda)\, g(\lambda) \quad . \tag{3.1}$$

The marginal density function $f(\theta)$ can be estimated, therefore, through

$$f(\theta) = \int_{-\infty}^{\infty} \xi(\lambda,\theta)\, d\lambda \quad . \tag{3.2}$$

The above procedure can be applied for each item score group of the item whose operating characteristics are being estimated, and the operating characteristic, $P_{x_g}(\theta)$, of the graded response category x_g of item g is estimated by

$$\hat{P}_{x_g}(\theta) = N_{x_g}\, \hat{f}_{x_g}(\theta) \left[\sum_{s=0}^{m_g} N_s\, \hat{f}_s(\theta) \right]^{-1}, \tag{3.3}$$

where N_{x_g} is the number of examinees whose item scores are x_g, and $\hat{f}_{x_g}(\theta)$ is the estimated density function of θ for the group of all the examinees whose item scores are uniformly x_g.

In the present research, the density function, $g_{x_g}(\lambda)$, for each item score group is approximated by polynomials of degrees 3, 4 and 5 by the method of moments (Elderton and Johnson, 1969, Johnson and Kotz, 1970, Samejima, 1977c), adopted for the subset of the observed maximum likelihood estimates. Both the density function and the operating characteristics are estimated by using each of these three estimated density functions, and these cases are called Degree 3, 4 and 5 Cases, respectively. The conditional density, $\phi(\theta|\lambda)$, is approximated by a normal density function using the estimated first two moments as the two parameters, which are obtained through (2.7) and (2.8) by replacing $g(\lambda)$ by $\hat{g}_{x_g}(\lambda)$. The present procedure is called Bivariate P.D.F. Approach with Normal Approach Method, therefore, and is shortened as Bivariate Normal Approach Method. The integration in (3.2) is approximated by the simple sum of the products of the estimated bivariate density of θ at the midpoint of the subinterval of λ and the subinterval width. In the present research, the subinterval width adopted is 0.1.

IV Results I: Approximated Density Functions of the Maximum Likelihood Estimate $\hat{\theta}$ and Regressions of Ability θ on $\hat{\theta}$

Table 4-1 presents the coefficients of the polynomials of degrees 3, 4 and 5 approximating the density function of the maximum likelihood estimate $\hat{\theta}$, for each of the two item score groups, i.e., the failure and success groups, for each of the ten binary items. Each polynomial has the form

$$(4.1)^* \quad \hat{g}(\hat{\theta}) = \alpha + \beta\hat{\theta} + \gamma\hat{\theta}^2 + \delta\hat{\theta}^3 + \nu\hat{\theta}^4 + \zeta\hat{\theta}^5 \quad ,$$

with the fifth and sixth terms excluded in Degree 3 Case, and with the sixth term excluded in Degree 4 Case. Also presented in the same table are the coefficients of the polynomials derived as the first derivative, the second derivative, etc., of each approximated density function, which are used in estimating the conditional moments of θ, given $\hat{\theta}$. The first through fourth conditional moments and the coefficients β_1 and β_2 and Pearson's criterion κ (Elderton and Johnson, 1969, Samejima, 1977c) are presented as Table A-2-1 of Appendix II.

Figure 4-1 presents these polynomials which are readjusted proportionally to the relative sizes of the item score groups for each item, so that the sum of the two areas of the curves for the success and failure groups should make unity. For convenience, hereafter, we shall call them approximated shared density functions of item g. The actual frequency distributions of the maximum likelihood estimate for the two item score groups, which are also adjusted to the relative sizes of the groups in the same manner as the approximated polynomials, are shown in the same figure for the sake of comparison. The curves for the polynomials are truncated for the values less than zero. Unusual rises of the curves

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* For simplicity, $\hat{g}(\hat{\theta})$ is used instead of $\hat{g}_{x_g}(\hat{\theta})$, etc.

TABLE 4-1

Coefficients of the Polynomials Obtained by the Method of Moments Which Is Applied for the Maximum Likelihood Estimates $\hat{\theta}$ for Each Item Score Group of Each of the Ten Binary Items. They Are Adjusted to Make the Total Frequency of Each Score Group Unity. Also Presented Are the Coefficients of the Polynomials Derived by the Successive Differentiations of the Original Polynomials.

DEGREE 3 CASE: Failure

ITEM	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\delta}$
1	-13.63685 -16.74922 -12.30370 -4.22304	-16.74922 -12.30370 -4.22304	-6.15185 -2.11152	-0.70384
2	0.65612 2.09618 4.27154 3.17421	2.09618 4.27154 3.17421	2.13577 1.58715	0.52905
3	-0.02069 0.54655 2.08423 1.74613	0.54655 2.08423 1.74613	1.04212 0.87306	0.29102
4	0.09447 -0.12785 0.38563 0.49867	-0.12785 0.38563 0.49867	0.19482 0.24933	0.08311
5	0.13532 -0.19417 0.22950 0.40176	-0.19417 0.22950 0.40176	0.11475 0.20088	0.06696
6	0.21334 -0.16811 -0.02451 0.13244	-0.16811 -0.02451 0.13244	-0.01225 0.06622	0.02207
7	0.24407 -0.14805 -0.05374 0.10292	-0.14805 -0.05374 0.10292	-0.02687 0.05146	0.01715
8	0.23419 -0.09575 -0.03522 0.08404	-0.09575 -0.03522 0.08404	-0.01761 0.04202	0.01401
9	0.25929 -0.05016 -0.06428 0.02207	-0.05016 -0.06428 0.02207	-0.03214 0.01103	0.00368
10	0.24009 -0.03561 -0.04882 0.02209	-0.03561 -0.04882 0.02209	-0.02441 0.01104	0.00368

TABLE 4-1: Coefficients of the Polynomials (Continued)

DEGREE 3 CASE: Success

ITEM	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\delta}$
1	0.23023 0.00818 -0.03931 -0.00457	0.00818 -0.03931 -0.00457	-0.01566 -0.00249 	-0.00083
2	0.24030 0.03501 -0.04845 -0.02044	0.03501 -0.04845 -0.02044	-0.02422 -0.01022 	-0.00241
3	0.25911 0.04791 -0.06301 -0.01967	0.04791 -0.06301 -0.01967	-0.03150 -0.00584 	-0.00328
4	0.24363 0.08135 -0.05038 -0.05211	0.08135 -0.05038 -0.05211	-0.02515 -0.02605 	-0.00868
5	0.24020 0.15146 -0.04596 -0.11494	0.15146 -0.04596 -0.11494	-0.02298 -0.05747 	-0.01916
6	0.21257 0.16724 -0.01904 -0.14021	0.16724 -0.01904 -0.14021	-0.00952 -0.07011 	-0.02337
7	0.10047 0.22725 0.30156 -0.51220	0.22725 0.30156 -0.51220	0.15078 -0.25610 	-0.08537
8	0.11109 0.06830 0.54127 -0.63407	0.06830 0.54127 -0.63407	0.27063 -0.31703 	-0.10568
9	0.32232 -1.24074 3.01049 -2.33785	-1.24074 3.01049 -2.33785	1.50525 -1.16893 	-0.38564
10	0.68666 -1.39388 2.55546 -1.81037	-1.39388 2.55546 -1.81037	1.27772 -0.90519 	-0.30173

TABLE 4-1: Coefficients of the Polynomials
(Continued)

DEGREE 4 CASE: Failure

ITEM	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\delta}$	$\hat{\nu}$
1	137.77905 267.04004 378.84937 348.45150 156.16150	267.04004 378.84937 348.45150 156.16150	189.42471 174.22595 78.08075	58.07532 26.02692	6.50673
2	0.37436 0.94272 1.33583 -1.17588 -2.91753	0.94272 1.33583 -1.17588 -2.91753	0.66792 -0.58754 -1.45877	-0.19558 -0.48626	-0.12156
3	4.82321 13.33854 25.38846 28.13296 14.08853	13.33854 25.38846 28.13296 14.08853	12.69423 14.06658 7.04447	4.68859 2.34816	0.58704
4	0.12594 -0.08551 0.08158 -0.41113 -0.79920	-0.08551 0.08158 -0.41113 -0.79920	0.04079 -0.20557 -0.35960	-0.06852 -0.13320	-0.03330
5	0.11746 -0.16150 0.52715 1.03724 0.49448	-0.16150 0.52715 1.03724 0.49448	0.26357 0.51862 0.24724	0.17287 0.08241	0.02060
6	0.19843 -0.15701 0.01501 0.11200 -0.07617	-0.15701 0.01501 0.11200 -0.07617	0.00751 0.05600 -0.03808	0.01867 -0.01269	-0.00317
7	0.24525 -0.16830 -0.06401 0.16401 0.08295	-0.16830 -0.06401 0.16401 0.08295	-0.03200 0.08200 0.04197	0.02723 0.01399	0.00350
8	0.23113 -0.09470 -0.02535 0.07297 -0.02517	-0.09470 -0.02535 0.07297 -0.02517	-0.01268 0.03648 -0.01259	0.01216 -0.00420	-0.00105
9	0.24500 -0.03681 -0.03308 -0.00546 -0.07160	-0.03681 -0.03308 -0.00546 -0.07160	-0.01654 -0.00273 -0.03580	-0.00091 -0.01193	-0.00298
10	0.22176 -0.03174 -0.00656 0.01592 -0.06718	-0.03174 -0.00656 0.01592 -0.06718	-0.00348 0.00796 -0.03359	0.00265 -0.01120	-0.00280

TABLE 4-1: Coefficients of the Polynomials
(Continued)

DEGREE 4 CASE: Success

ITEM	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\delta}$	$\hat{\nu}$
1	0.20613 0.00301 0.02284 0.00436 -0.11257	0.00301 0.02284 0.00436 -0.11257	0.01142 0.00218 -0.05628	0.00073 -0.01876	-0.00465
2	0.23116 0.03654 -0.02758 -0.02352 -0.03350	0.03654 -0.02758 -0.02352 -0.03350	-0.01379 -0.01176 -0.01675	-0.00352 -0.00558	-0.00140
3	0.25331 0.04638 -0.04784 -0.01689 -0.02789	0.04638 -0.04784 -0.01689 -0.02789	-0.02392 -0.00844 -0.01395	-0.00281 -0.00465	-0.00116
4	0.22845 0.07794 -0.01111 -0.04594 -0.07135	0.07794 -0.01111 -0.04594 -0.07135	-0.00555 -0.02297 -0.03567	-0.00766 -0.01189	-0.00297
5	0.23661 0.14053 -0.03018 -0.08381 -0.06017	0.14053 -0.03018 -0.08381 -0.06017	-0.01505 -0.04151 -0.03009	-0.01357 -0.01003	-0.00251
6	0.19183 0.14840 0.04493 -0.09992 -0.14481	0.14840 0.04493 -0.09992 -0.14481	0.02247 -0.04996 -0.07241	-0.01665 -0.02414	-0.00603
7	0.08335 0.23740 0.46854 -0.95172 0.43504	0.23740 0.46854 -0.95172 0.43504	0.23427 -0.49586 0.21752	-0.16529 0.07251	0.01813
8	0.11252 0.07002 0.51837 -0.57585 -0.04569	0.07002 0.51837 -0.57585 -0.04569	0.25819 -0.28993 -0.02284	-0.09664 -0.00761	-0.00190
9	5.38818 -15.53051 20.82194 -35.96725 19.15225	-15.53051 30.82194 -35.96725 19.15225	15.41557 -17.98363 9.57613	-5.99455 3.19204	0.79801
10	0.86805 -2.03560 4.01823 -3.78958 1.22626	-2.03560 4.01823 -3.78958 1.22626	2.00911 -1.85455 0.61313	-0.63166 0.20438	0.05109

TABLE 4-1: Coefficients of the Polynomials
(Continued)

DEGREE 5 CASE: Failure

ITEM	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\delta}$	$\hat{\nu}$	$\hat{\zeta}$
1	650.45730 1470.93000 2605.90400 3392.25500 2889.53700 1210.31500	1470.93000 2605.90400 3392.25500 2889.53700 1210.31500	1302.95200 1656.12700 1444.76800 650.15770	565.37590 481.58950 201.71520	120.39730 50.42981	10.08596
2	-0.30289 -2.62252 -11.57472 -32.07065 -47.65668 -30.00513	-2.62252 -11.57472 -32.07065 -47.65668 -30.00513	-5.78736 -16.03532 -23.82834 -15.00256	-5.34511 -7.94278 -5.00265	-1.98569 -1.25021	-0.25004
3	-5.25593 -20.24649 -58.45508 -119.88280 -151.29410 -88.30103	-20.24649 -58.45508 -119.88280 -151.29410 -88.30103	-29.22154 -59.94141 -75.64705 -44.15051	-15.98047 -25.21570 -14.71684	-6.30353 -3.67921	-0.73584
4	0.14584 0.00792 0.04623 -1.57833 -3.79325 -2.63005	0.00792 0.04623 -1.57833 -3.79325 -2.63005	0.02311 -0.78517 -1.89662 -1.31503	-0.26306 -0.63221 -0.43834	-0.15805 -0.10559	-0.02192
5	0.13075 -0.14222 0.29144 -0.14441 -1.83578 -1.81321	-0.14222 0.29144 -0.14441 -1.83578 -1.81321	0.14572 -0.07221 -0.91789 -0.90661	-0.02407 -0.30596 -0.30220	-0.07649 -0.07555	-0.01511
6	0.19955 -0.15320 0.01090 0.09757 -0.06638 0.03647	-0.15320 0.01090 0.09757 -0.06638 0.03647	0.00545 0.04875 -0.02319 0.01824	0.01626 -0.01106 0.00608	-0.00277 0.00152	0.00030
7	0.25900 -0.17172 -0.14558 0.14388 0.48801 0.55525	-0.17172 -0.14558 0.14388 0.48801 0.55525	-0.07459 0.07194 0.24400 0.27762	0.02258 0.08133 0.09254	0.02033 0.02314	0.00463
8	0.23269 -0.09217 -0.03206 0.06053 -0.00568 0.04389	-0.09217 -0.03206 0.06053 -0.00568 0.04389	-0.01603 0.03026 -0.00294 0.02194	0.01009 -0.00658 0.00731	-0.00024 0.00183	0.00037
9	0.25511 -0.02419 -0.05751 -0.06148 -0.00481 0.17373	-0.02419 -0.05751 -0.06148 -0.00481 0.17373	-0.02856 -0.03074 -0.00240 0.02895	-0.01025 -0.00080 0.02895	-0.00020 0.00724	0.00145
10	0.22190 -0.03023 -0.00741 0.01105 -0.00626 0.01005	-0.03023 -0.00741 0.01105 -0.00626 0.01005	-0.00370 0.00553 -0.02212 0.00503	0.00184 -0.01104 0.00168	-0.00276 0.00042	0.00008

TABLE 4-1: Coefficients of the Polynomials
(Continued)

DEGREE 5 CASE: Success

ITEM	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\delta}$	$\hat{\nu}$	$\hat{\xi}$
1	0.20711	-0.00878	0.00965	0.00783	-0.00435	-0.00083
	-0.00878	0.01529	0.02348	-0.01729	-0.00414	
	0.01529	0.04657	-0.05217	-0.01657		
	0.04657	-0.10433	-0.04970			
	-0.10433	-0.05940				
	-0.05940					
2	0.22832	0.00629	-0.00925	0.01244	-0.00217	-0.00169
	0.00629	-0.01851	0.03722	-0.00869	-0.00845	
	-0.01851	0.07463	-0.02607	-0.03382		
	0.07463	-0.05213	-0.10145			
	-0.05213	-0.20290				
	-0.20290					
3	0.25848	-0.00487	-0.03337	0.02852	0.00069	-0.00371
	-0.00487	-0.06674	0.08556	0.00276	-0.01857	
	-0.06674	0.17112	0.00828	-0.07427		
	0.17112	0.01655	-0.22280			
	0.01655	-0.44560				
	-0.44560					
4	0.23153	0.04260	-0.01112	0.01370	-0.00185	-0.00250
	0.04260	-0.02225	0.04111	-0.00757	-0.01250	
	-0.02225	0.08222	-0.02271	-0.04599		
	0.08222	-0.04542	-0.14997			
	-0.04542	-0.29995				
	-0.29995					
5	0.24524	0.13259	-0.03865	-0.00384	0.00501	-0.00291
	0.13259	-0.07770	-0.01153	0.02004	-0.01453	
	-0.07770	-0.02305	0.06013	-0.05814		
	-0.02305	0.12026	-0.17441			
	0.12026	-0.34881				
	-0.34881					
6	0.19612	0.13469	0.01336	-0.00653	-0.00393	-0.00151
	0.13469	0.02672	-0.01558	-0.01572	-0.00756	
	0.02672	-0.03915	-0.04717	-0.03023		
	-0.03915	-0.09434	-0.09070			
	-0.09434	-0.18140				
	-0.18140					
7	0.08994	0.19482	0.20718	-0.04082	-0.06099	0.01436
	0.19482	0.41425	-0.12245	-0.24357	0.07178	
	0.41425	-0.24489	-0.73192	0.28712		
	-0.24489	-1.46384	0.86137			
	-1.46384	1.72273				
	1.72273					
8	0.13918	0.00786	0.03137	0.25781	-0.24869	0.04159
	0.00786	0.06274	1.07344	-0.59475	0.20797	
	0.06274	2.14688	-2.58425	0.83187		
	2.14688	-5.56850	2.49561			
	-5.56850	4.99121				
	4.99121					
9	5.62281	-16.36681	16.53229	-6.69630	1.00724	-0.02383
	-16.36681	33.06458	-20.08888	4.02895	-0.11916	
	33.06458	-40.17776	12.06864	-0.47665		
	-40.17776	24.17368	-1.42994			
	24.17768	-2.85987				
	-2.85987					
10	1.88480	-6.68246	9.43777	-5.98742	1.82668	-0.21998
	-6.68246	18.87553	-17.56227	7.30670	-1.09987	
	18.87553	-35.92453	21.52610	-4.39550		
	-35.92453	43.84021	-13.15848			
	43.84021	-26.35699				
	-26.35699					

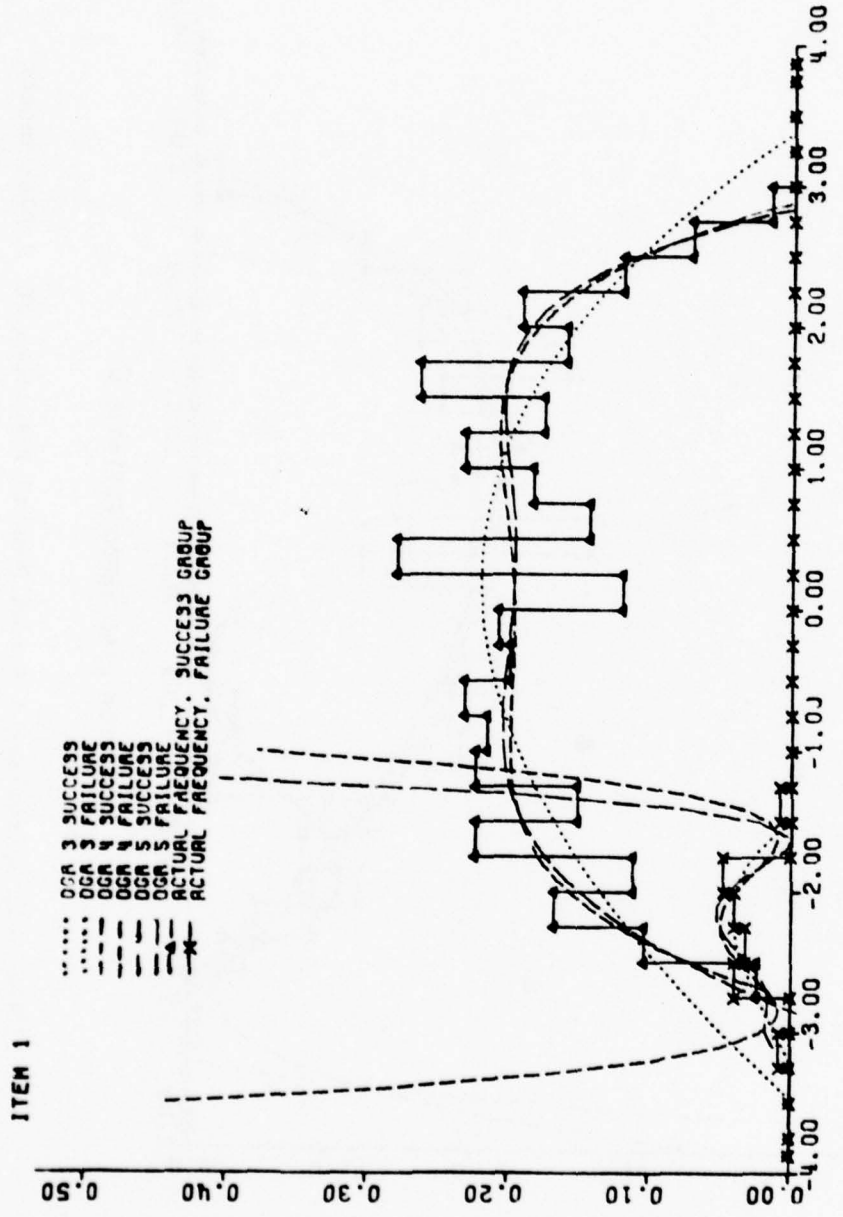

FIGURE 4-1

Estimated Shared Density Functions of the Maximum Likelihood Estimate for Each Item Score Group of Each of the Ten Binary Items, Obtained by Fitting Polynomials of Degrees 3, 4, and 5 by the Method of Moments. Also Presented Are the Corresponding Actual Frequency Ratios of the Maximum Likelihood Estimates.

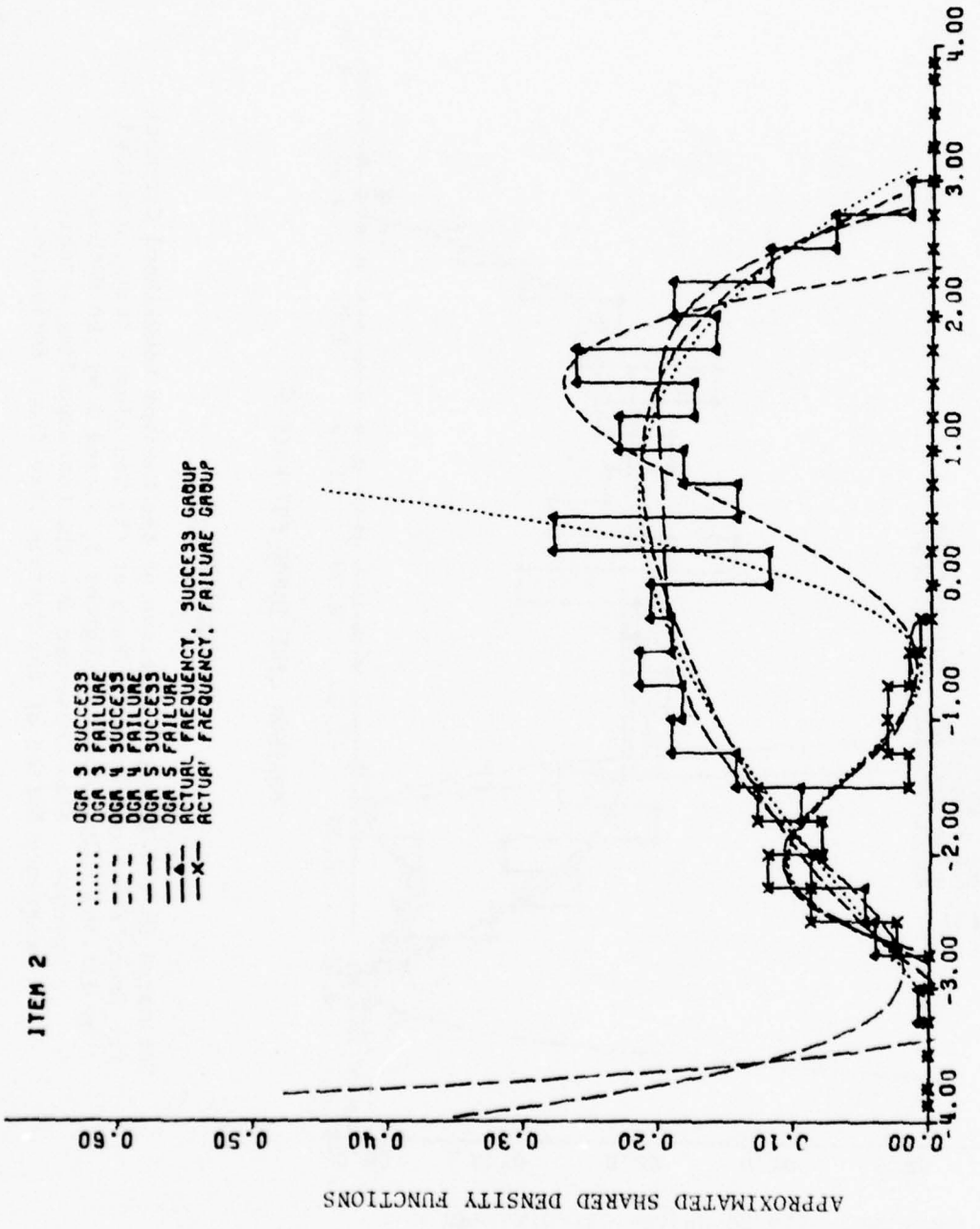

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

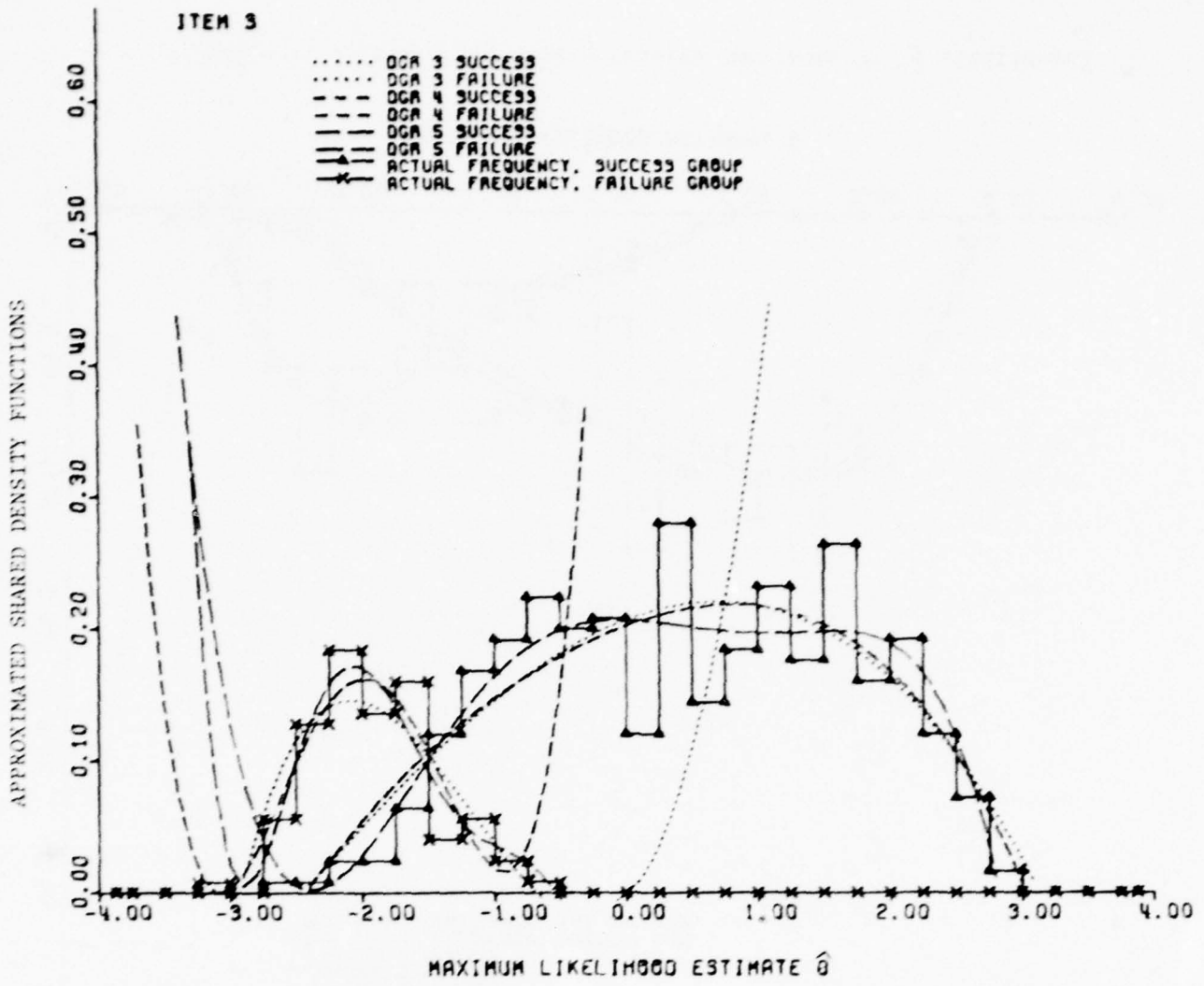

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

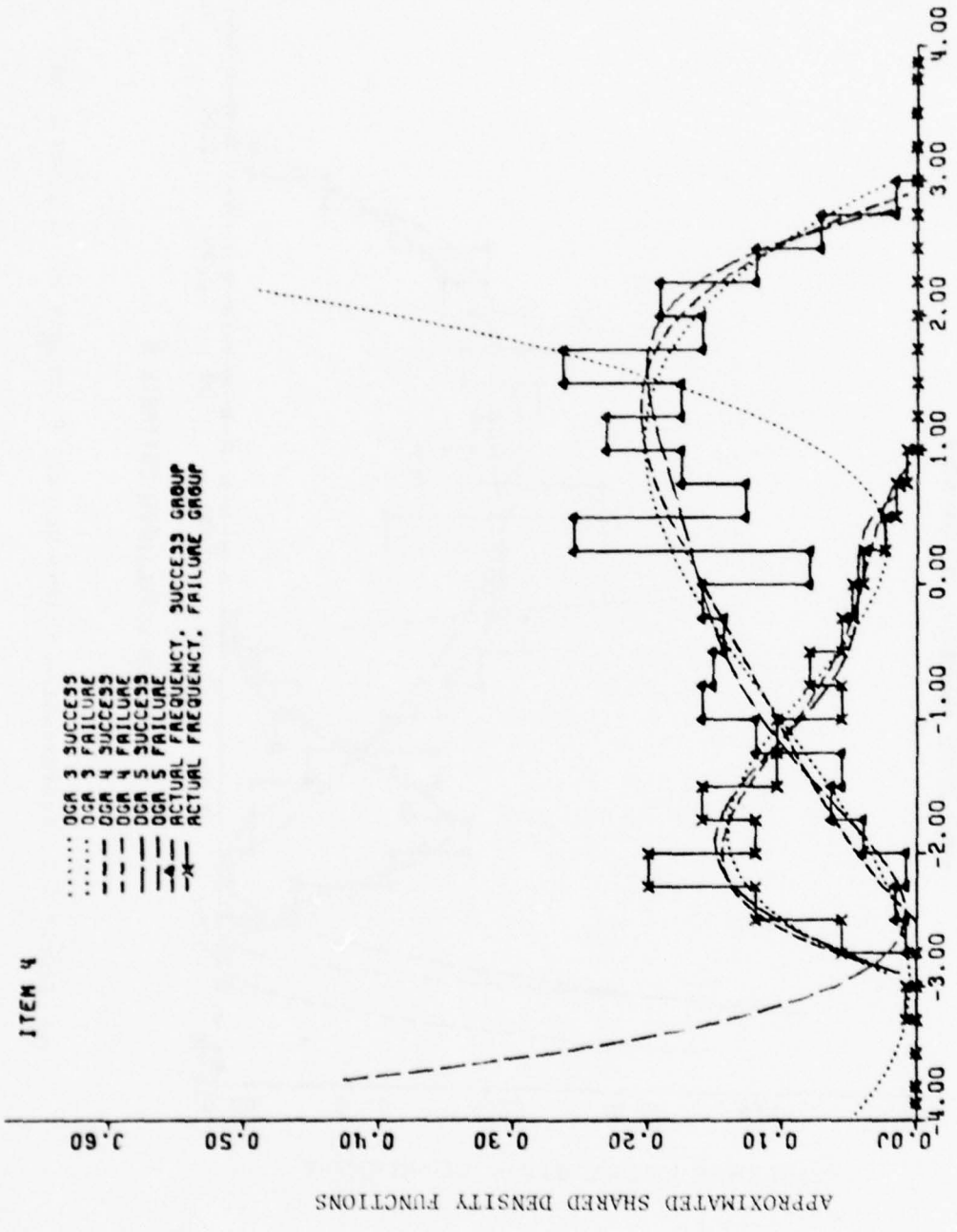

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

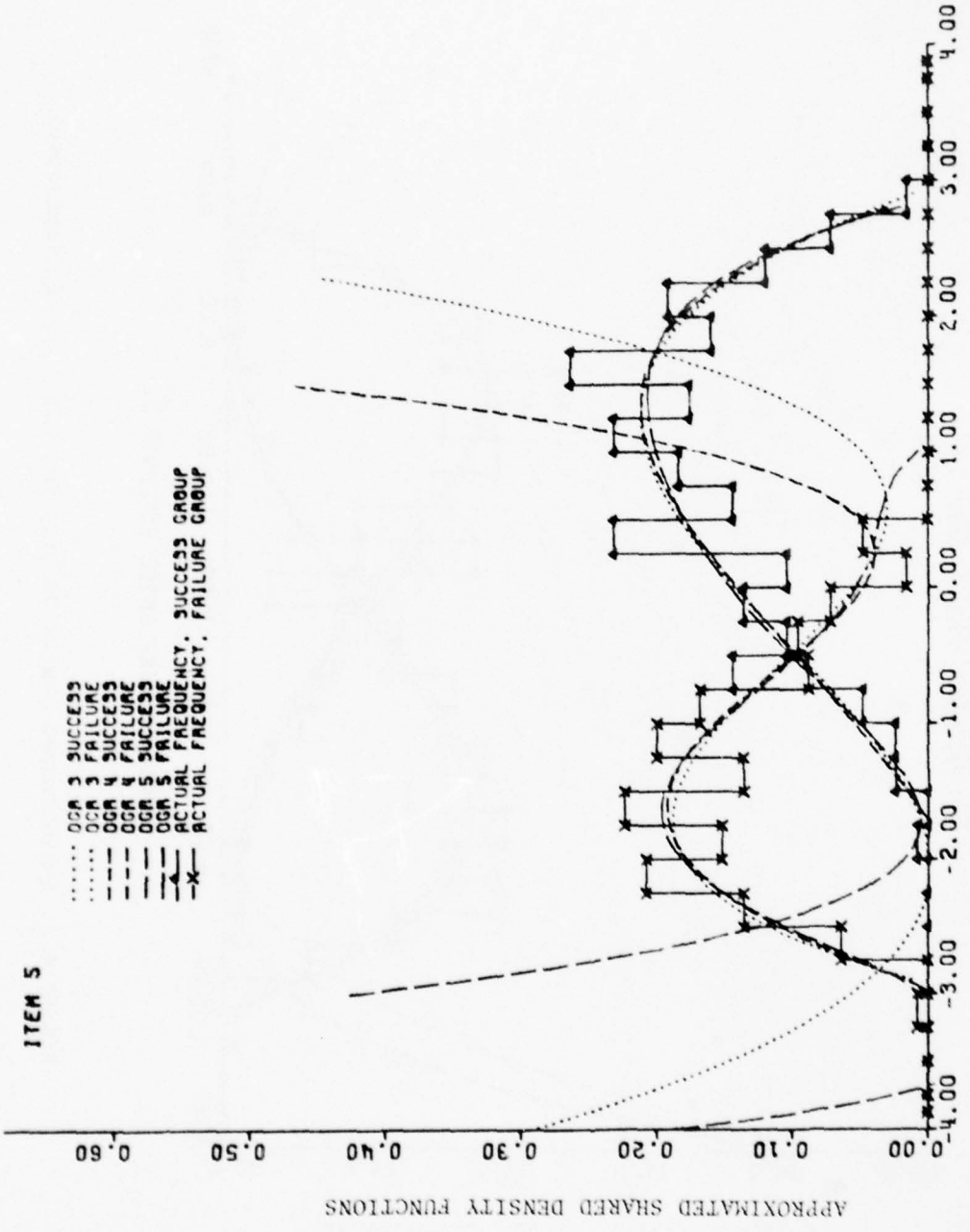

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

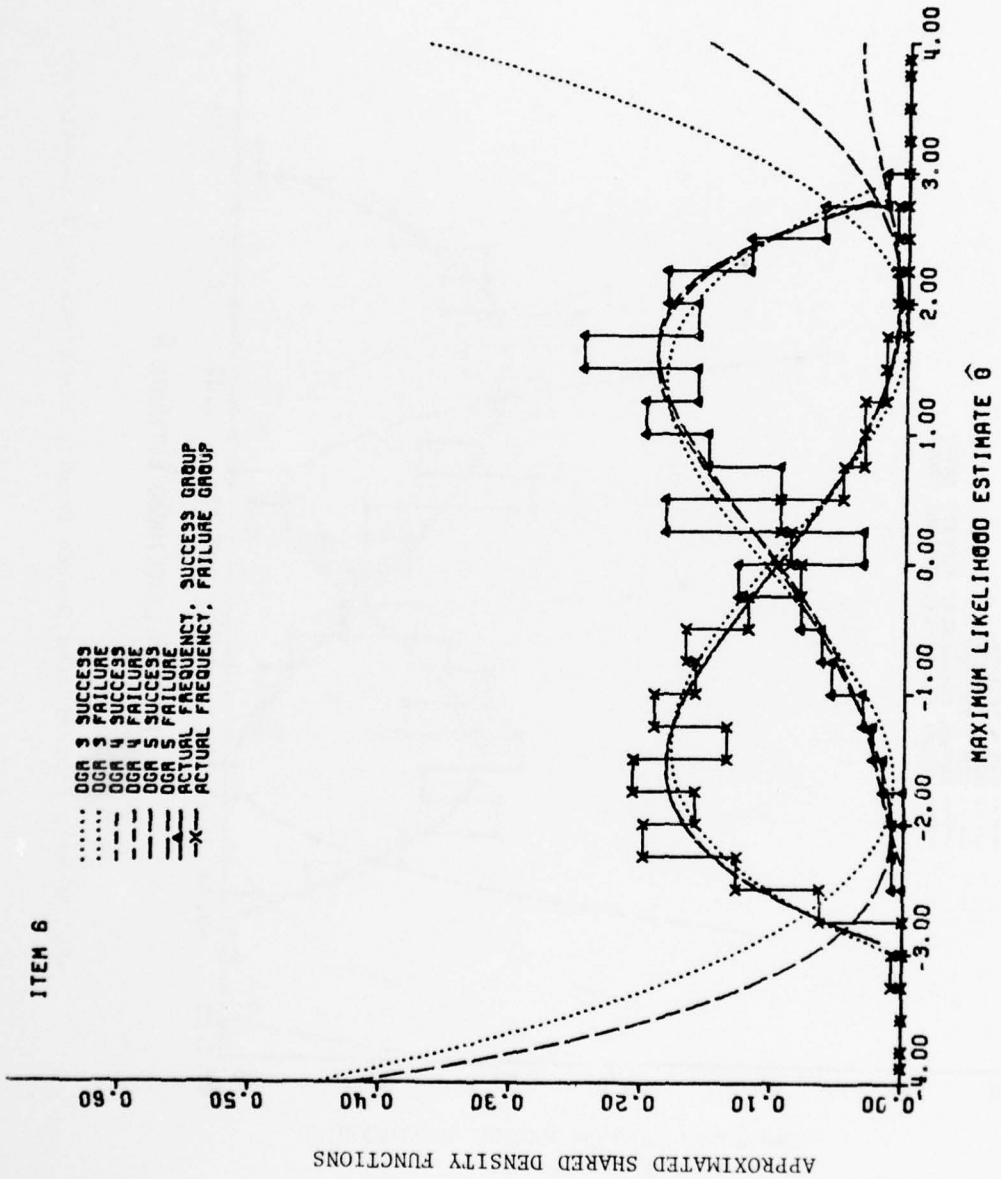

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

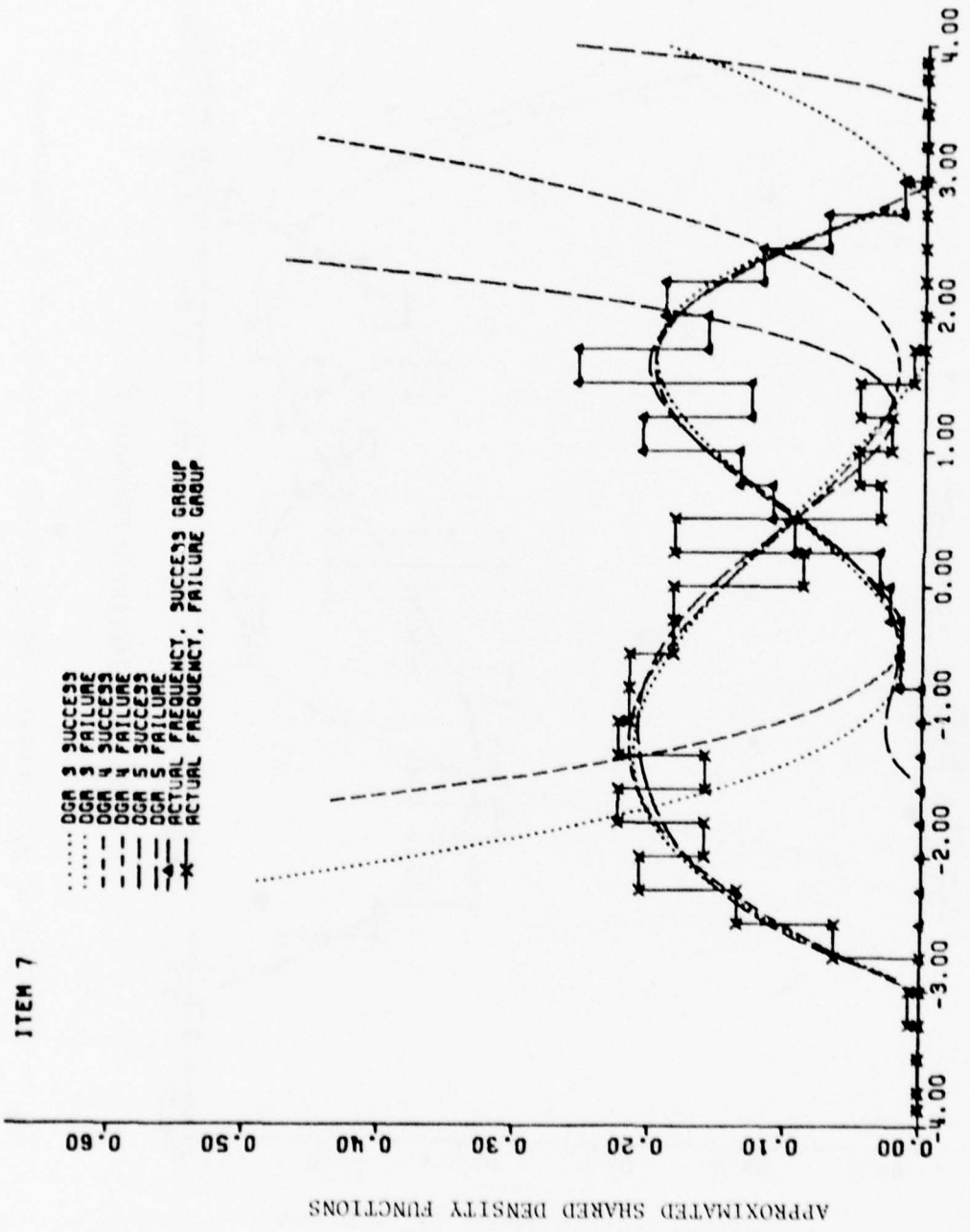

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

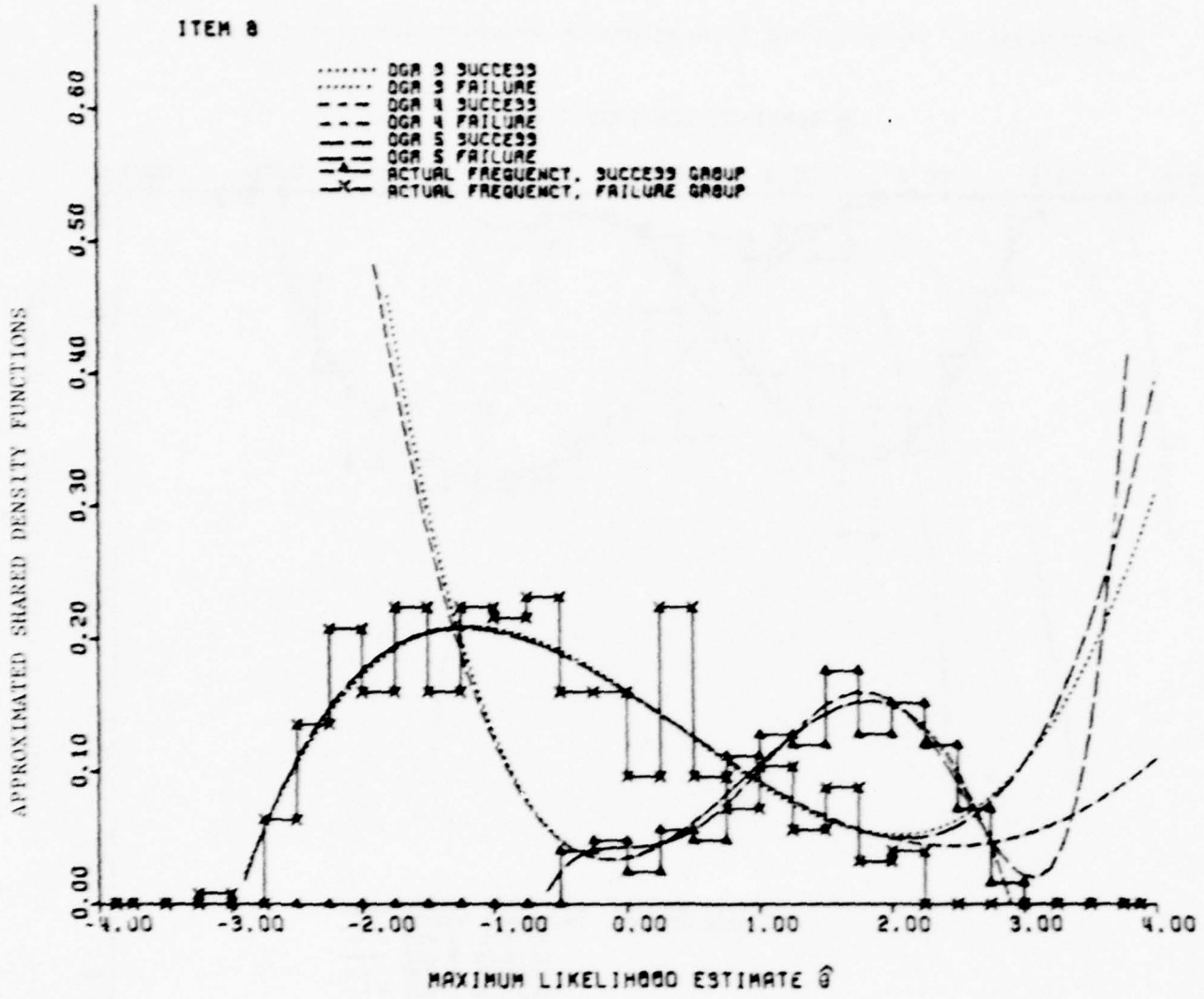

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

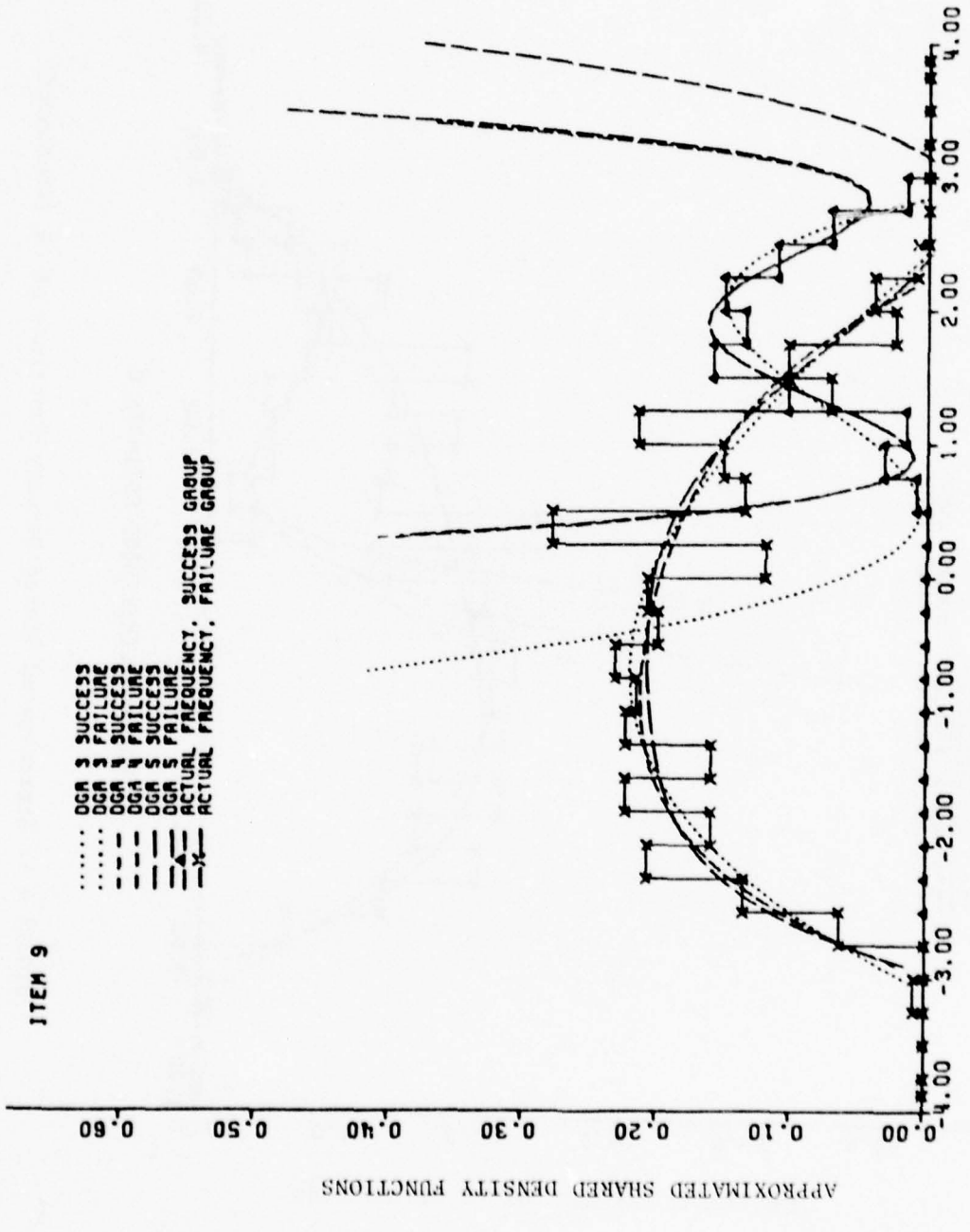

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

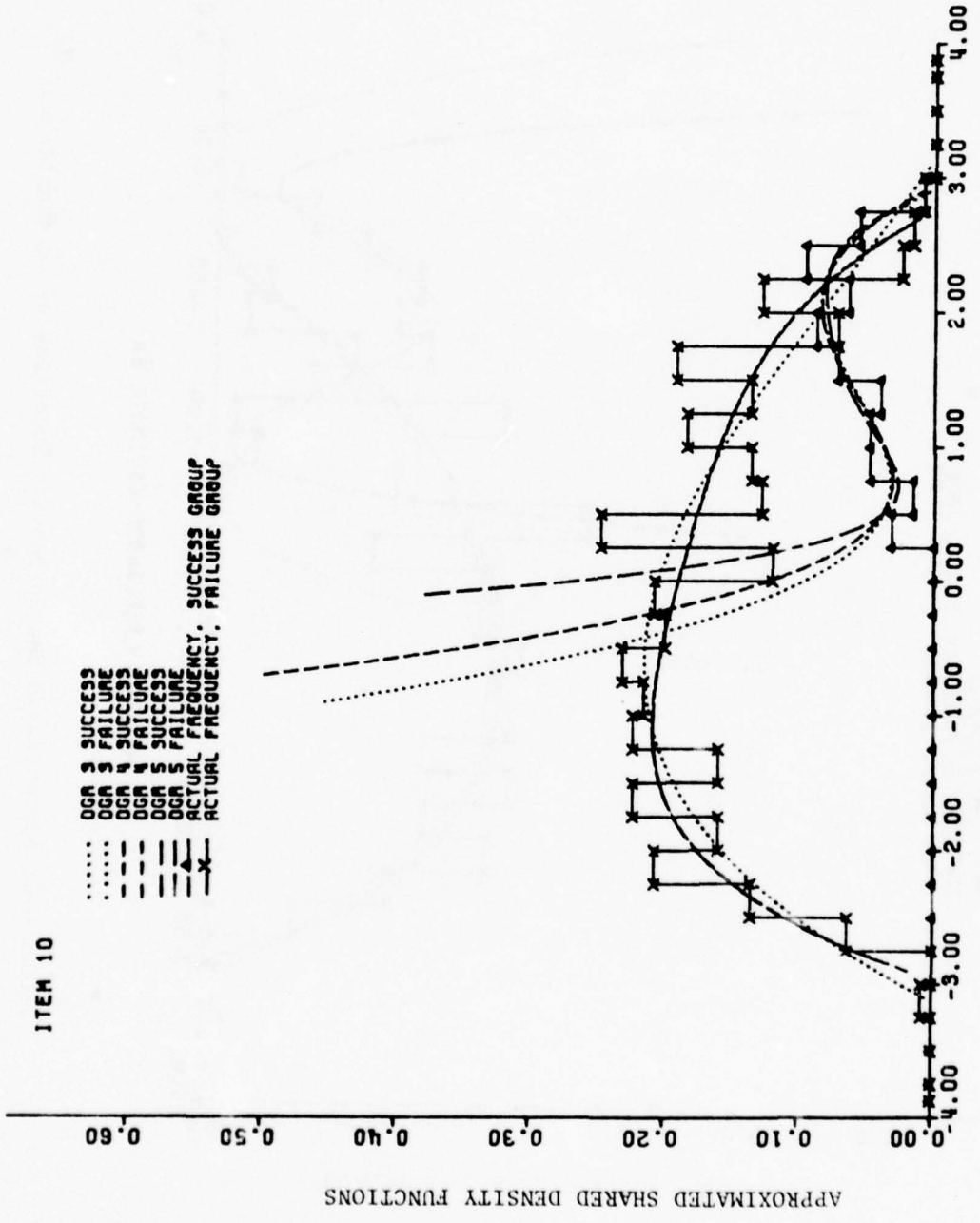

FIGURE 4-1: Approximated Shared Density Functions of $\hat{\theta}$ (Continued)

are plotted, however, to show how the polynomials fitted by the method of moments can assume unusual values outside the range of the actual maximum likelihood estimates in our data. It can be observed that for the items whose difficulty levels are intermediate, like items 5, 6, 7 and 8, the three curves are close to one another, for both the success and failure groups. In some of the other cases, the discrepancies among the three curves are substantial, like those of degree 3 for the success groups of items 1 and 9 and for the failure groups of items 1, 3 and 10, and those of degree 5 for the success groups of items 2 and 3.

Figure 4-2 presents the theoretical regression of ability θ on its maximum likelihood estimate $\hat{\theta}$, which is obtained by

$$(4.2) \qquad E(\theta|\hat{\theta}) = \int_{-\infty}^{\infty} \theta\, \xi(\hat{\theta},\theta)\, d\theta \left[\int_{-\infty}^{\infty} \xi(\hat{\theta},\theta)\, d\theta\right]^{-1} ,$$

where

$$(4.3) \qquad \xi(\hat{\theta},\theta) = P_g(\theta)\, f(\theta)\, \psi(\hat{\theta}|\theta) \left[\int_{-\infty}^{\infty} P_g(\theta)\, f(\theta)\, d\theta\right]^{-1} ,$$

$$(4.4) \qquad P_g(\theta) = [2\pi]^{-1/2} \int_{-\infty}^{a_g(\theta-b_g)} \exp[-t^2/2]\, dt ,$$

$$(4.5) \qquad f(\theta) \begin{cases} = 0.2 & \text{for } -2.5 < \theta < 2.5 \\ = 0.0 & \text{otherwise,} \end{cases}$$

$$(4.6) \qquad \psi(\hat{\theta}|\theta) = [2\pi\sigma]^{-1/2} \exp[-(\hat{\theta}-\theta)^2/(2\sigma^2)] ,$$

and the item parameters a_g and b_g are as shown in the columns labeled "TRUE" in Tables 6-3 and 6-4, respectively, for the success group of each of the ten binary items, and by replacing $P_g(\theta)$ by $Q_g(\theta)$ such that

$$(4.7) \qquad Q_g(\theta) = 1 - P_g(\theta)$$

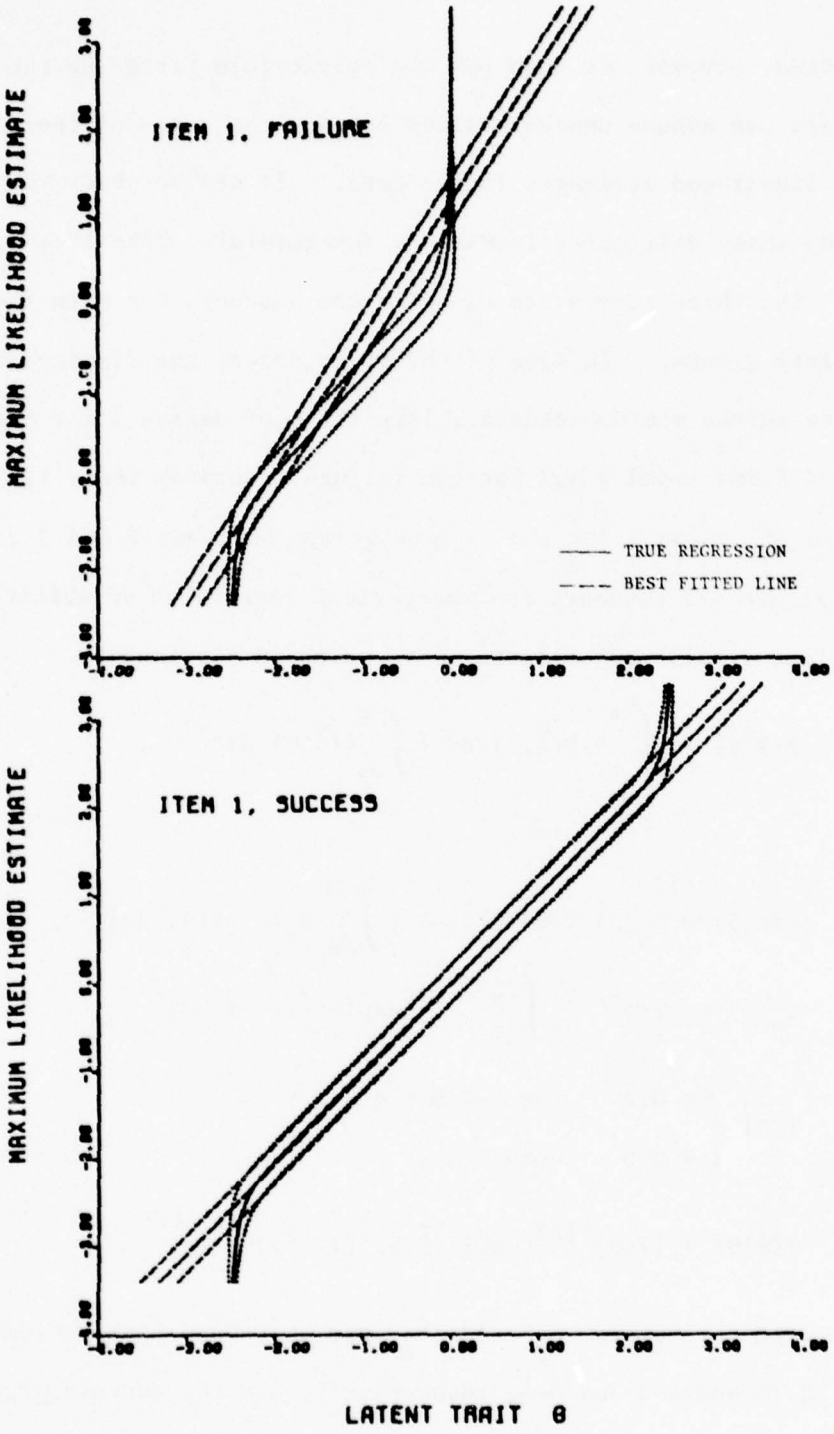

FIGURE 4-2

Comparison of the Theoretical Regression for Ability θ on Its Maximum Likelihood Estimate $\hat{\theta}$ with the Best Fitted Line of Ability θ, on $\hat{\theta}$, for Each Item Score Group of Each of the Ten Binary Items. Also the Standard Errors of Estimation Are Shown on Each Side of the Regression, and of the Best Fitted Line.

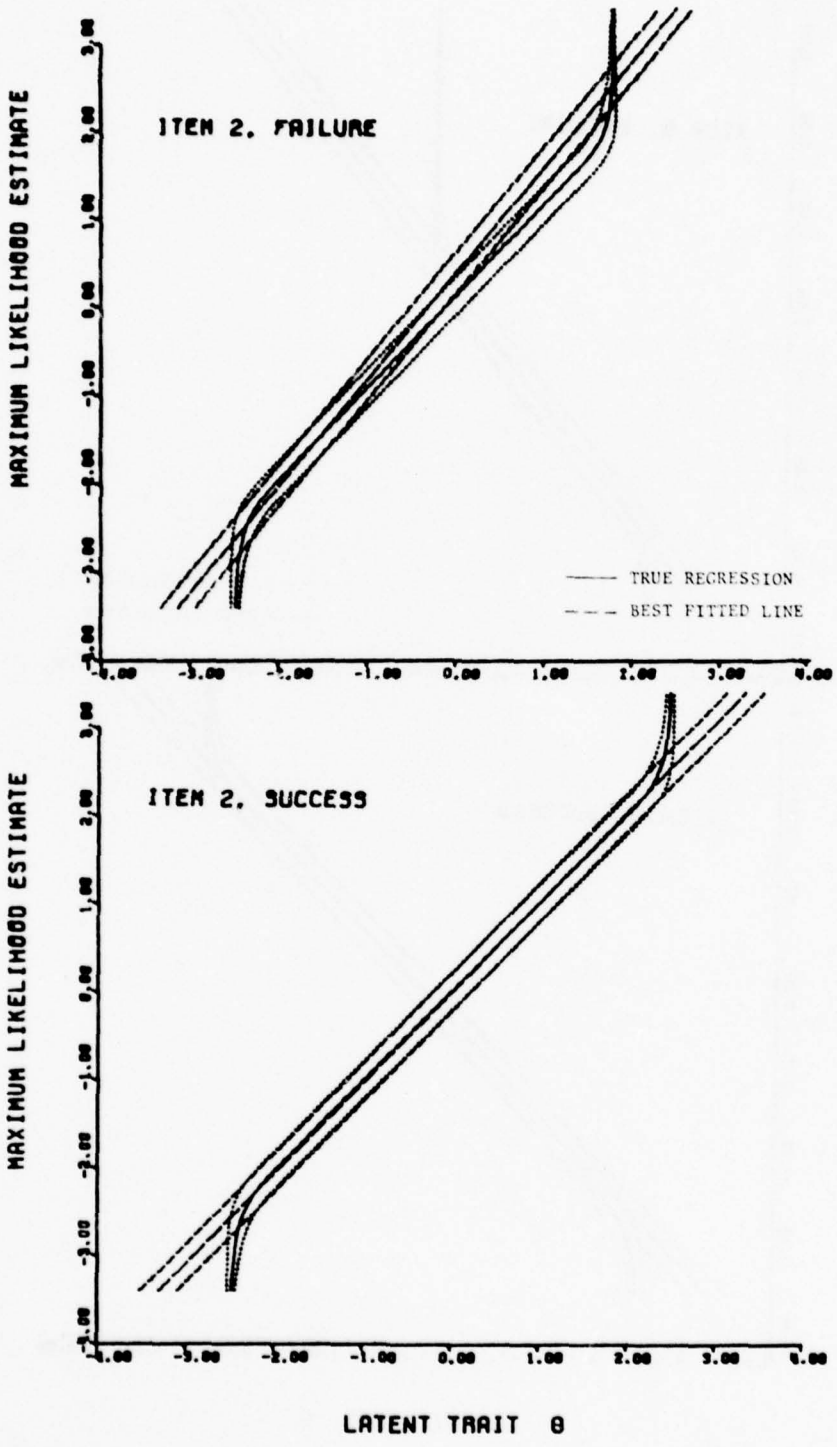

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

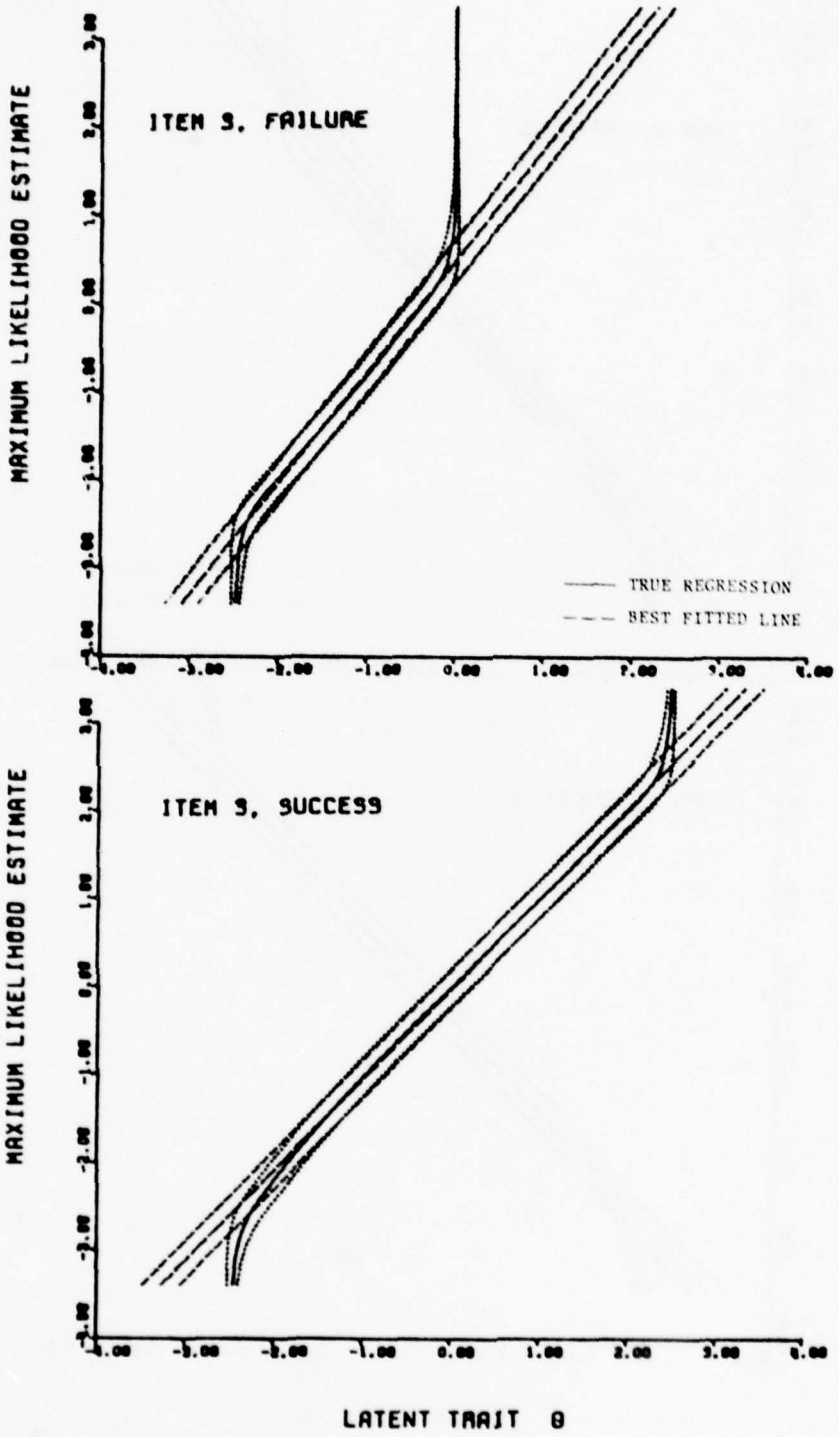

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

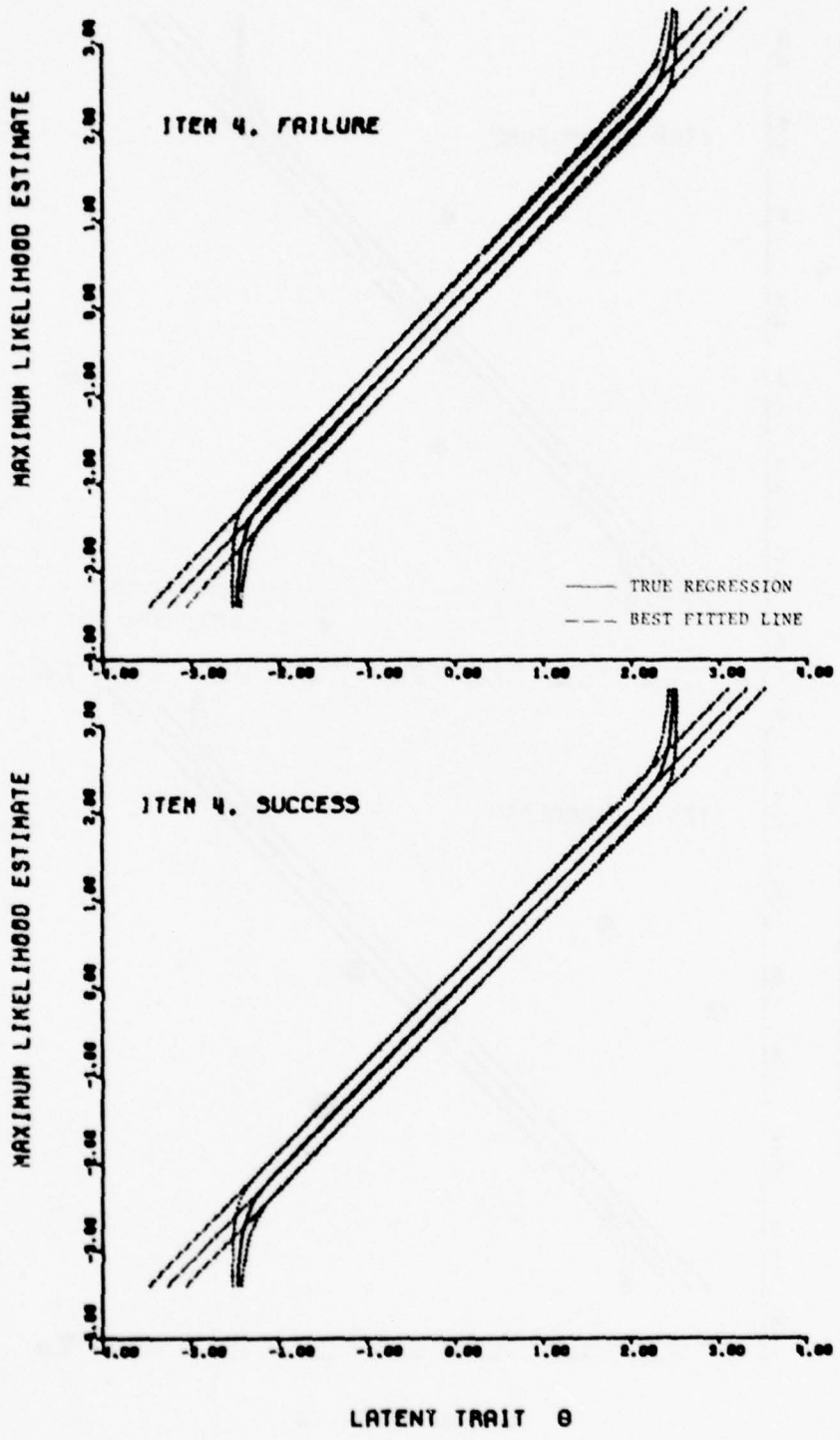

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

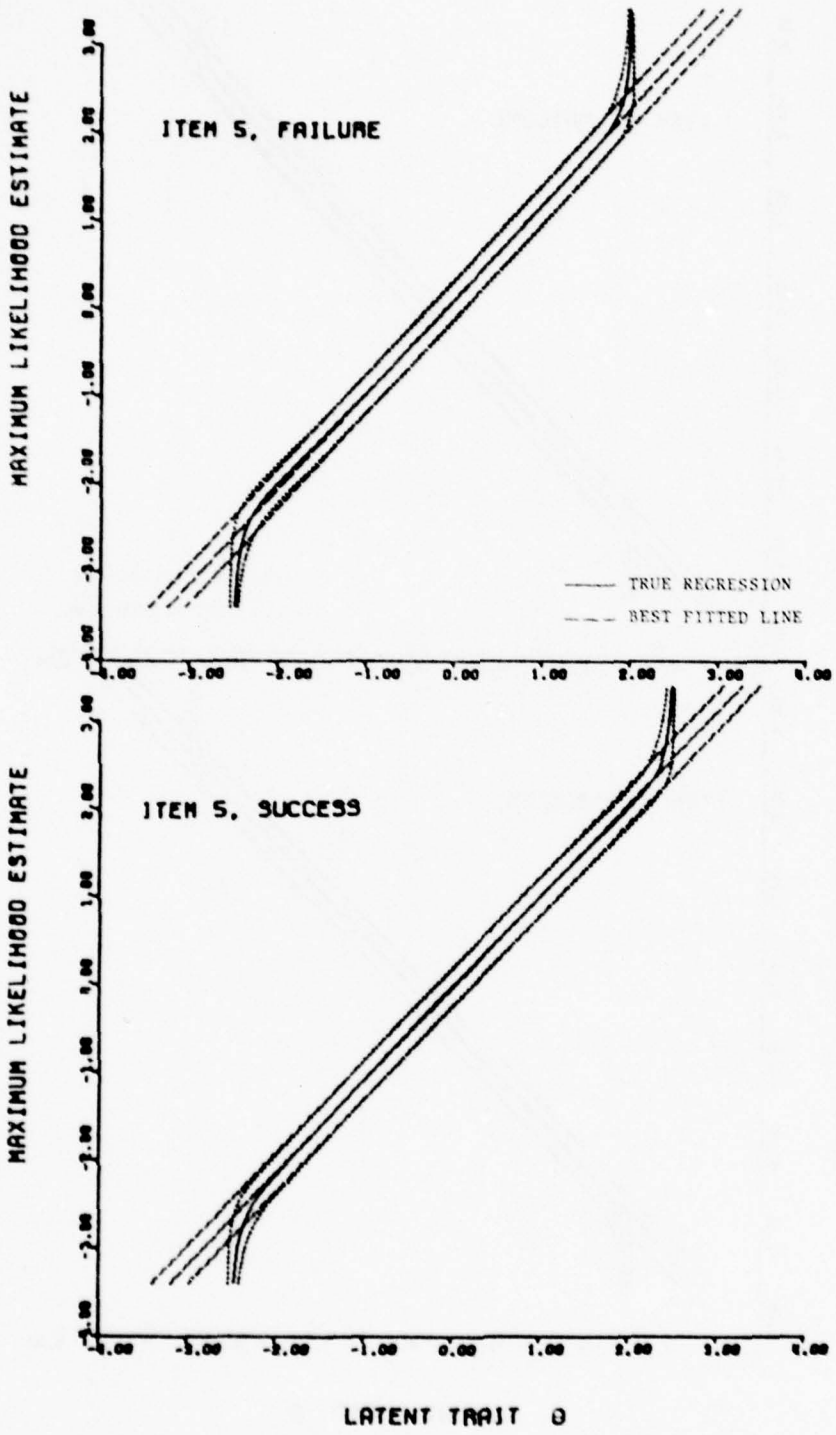

FIGURE 4-2: Comparison of Theoretical Regression of $\hat{\theta}$ on θ with the Best Fitted Line of $\hat{\theta}$ on θ (Continued)

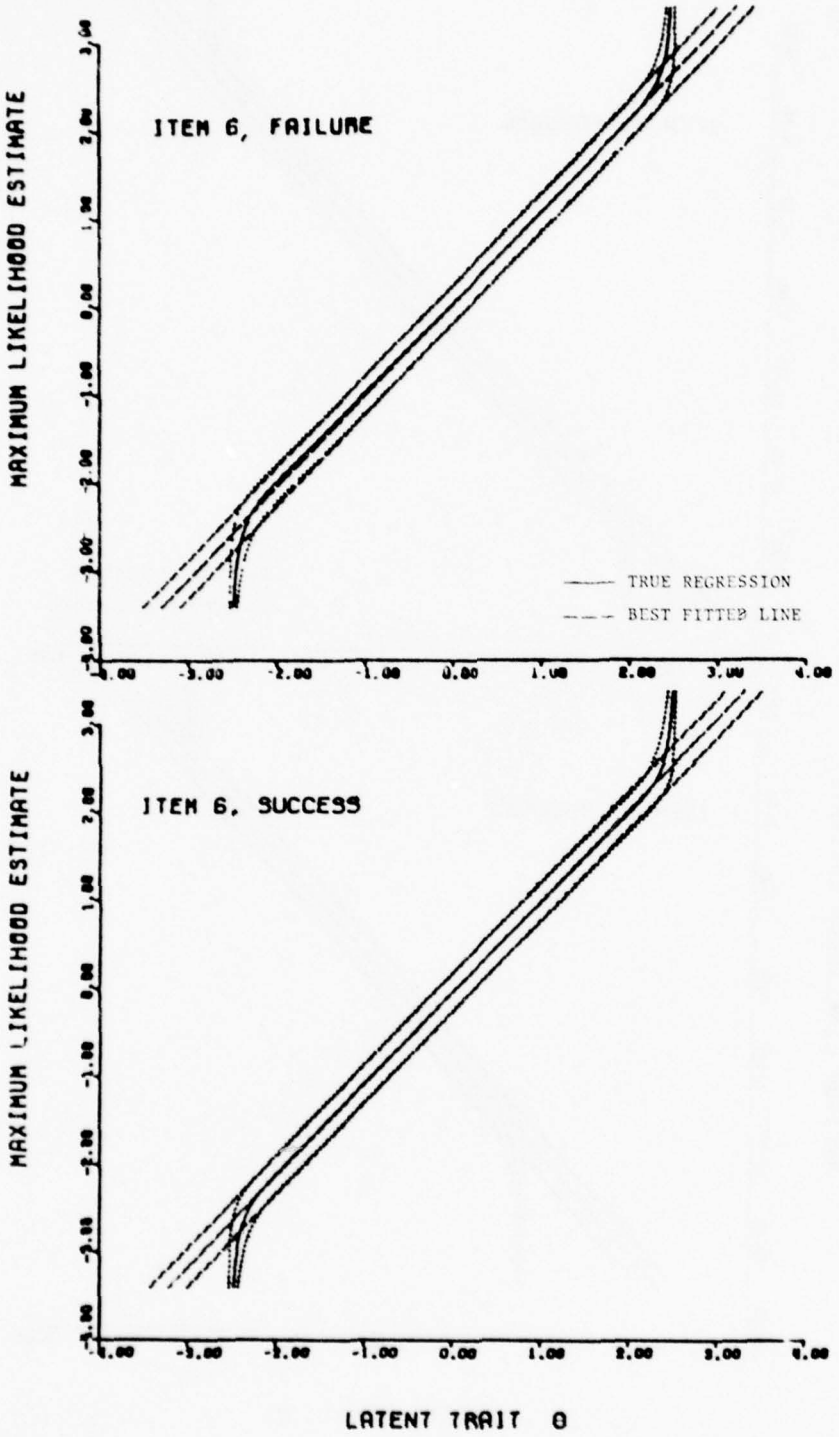

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

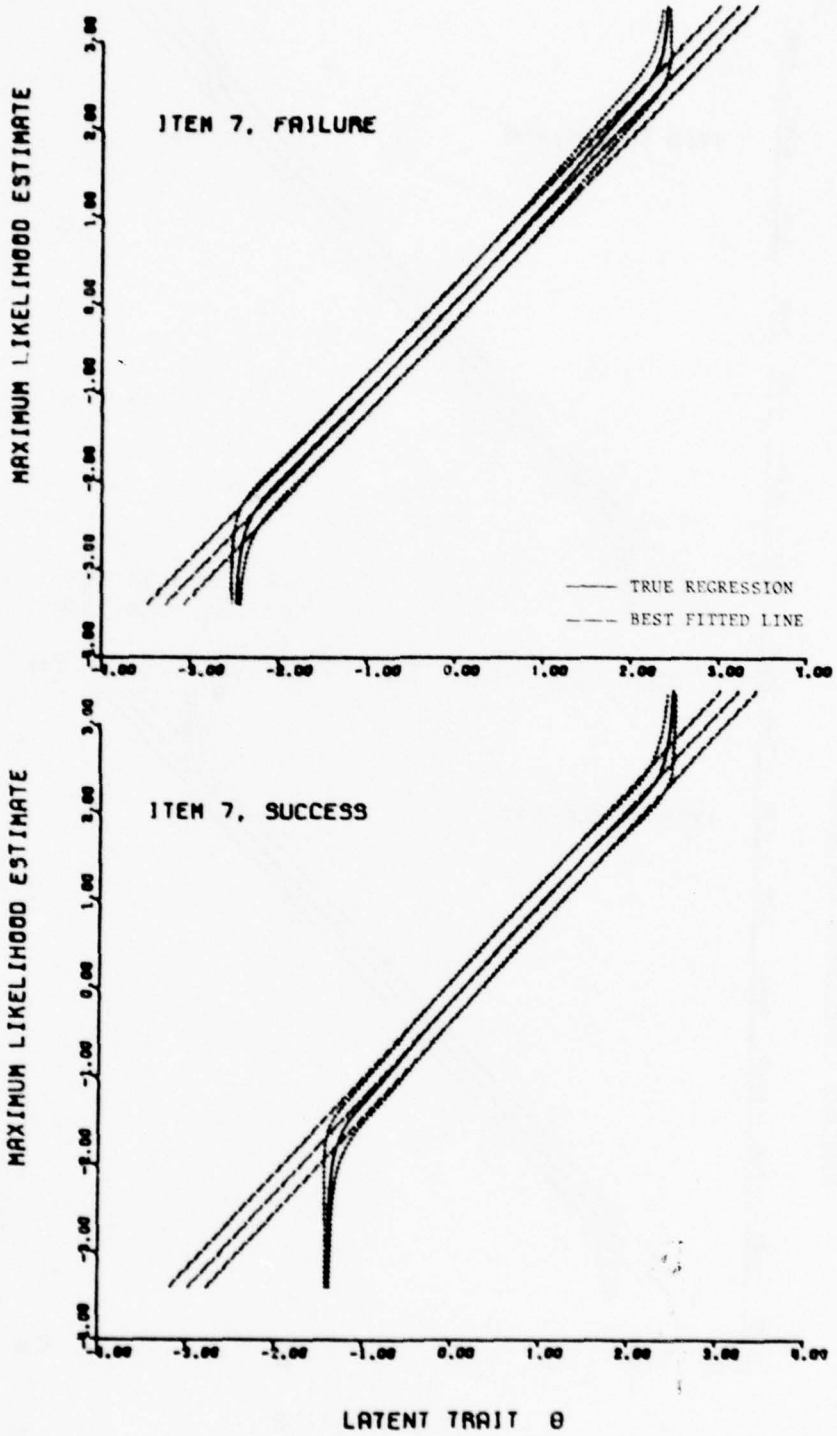

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

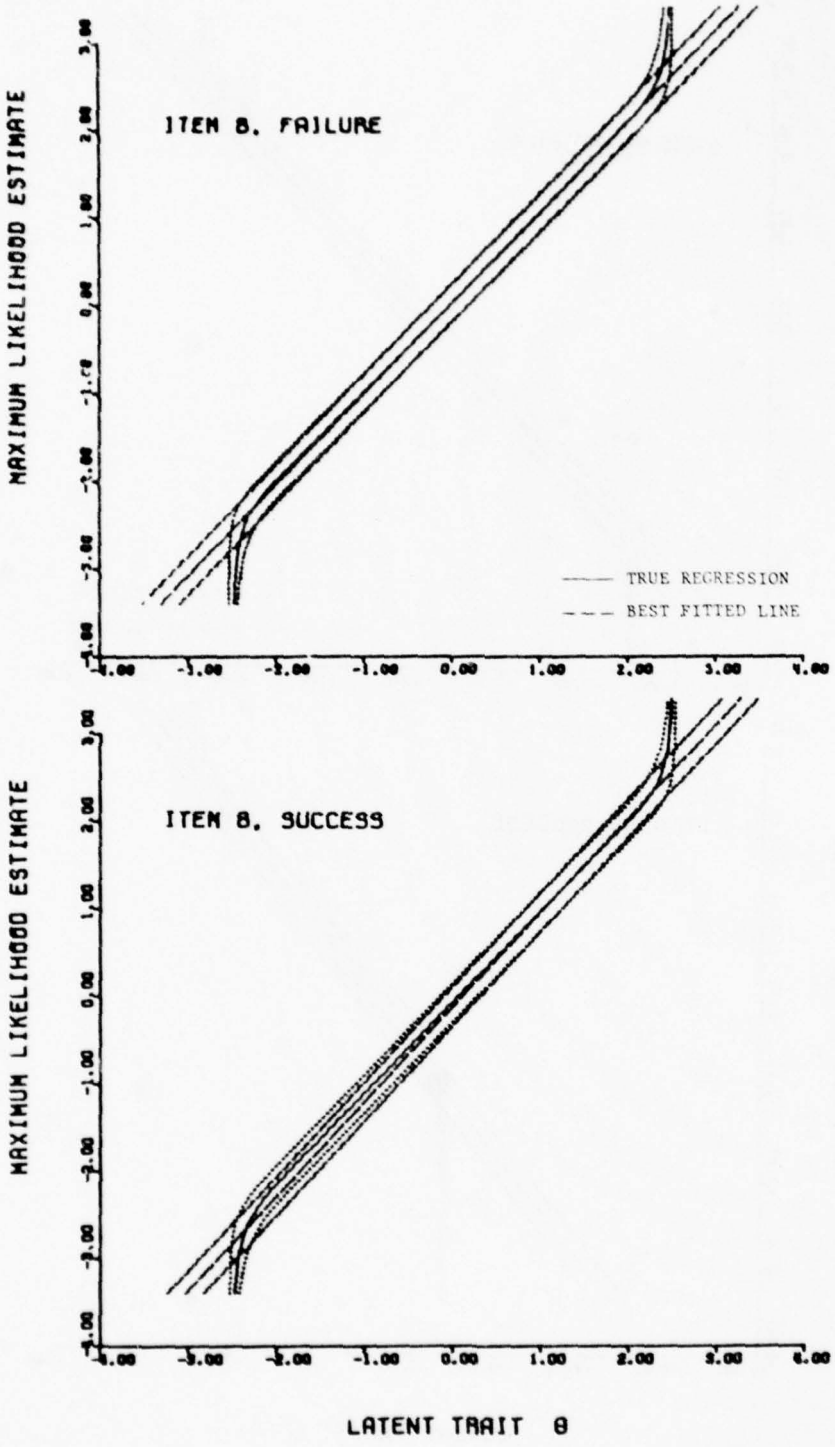

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

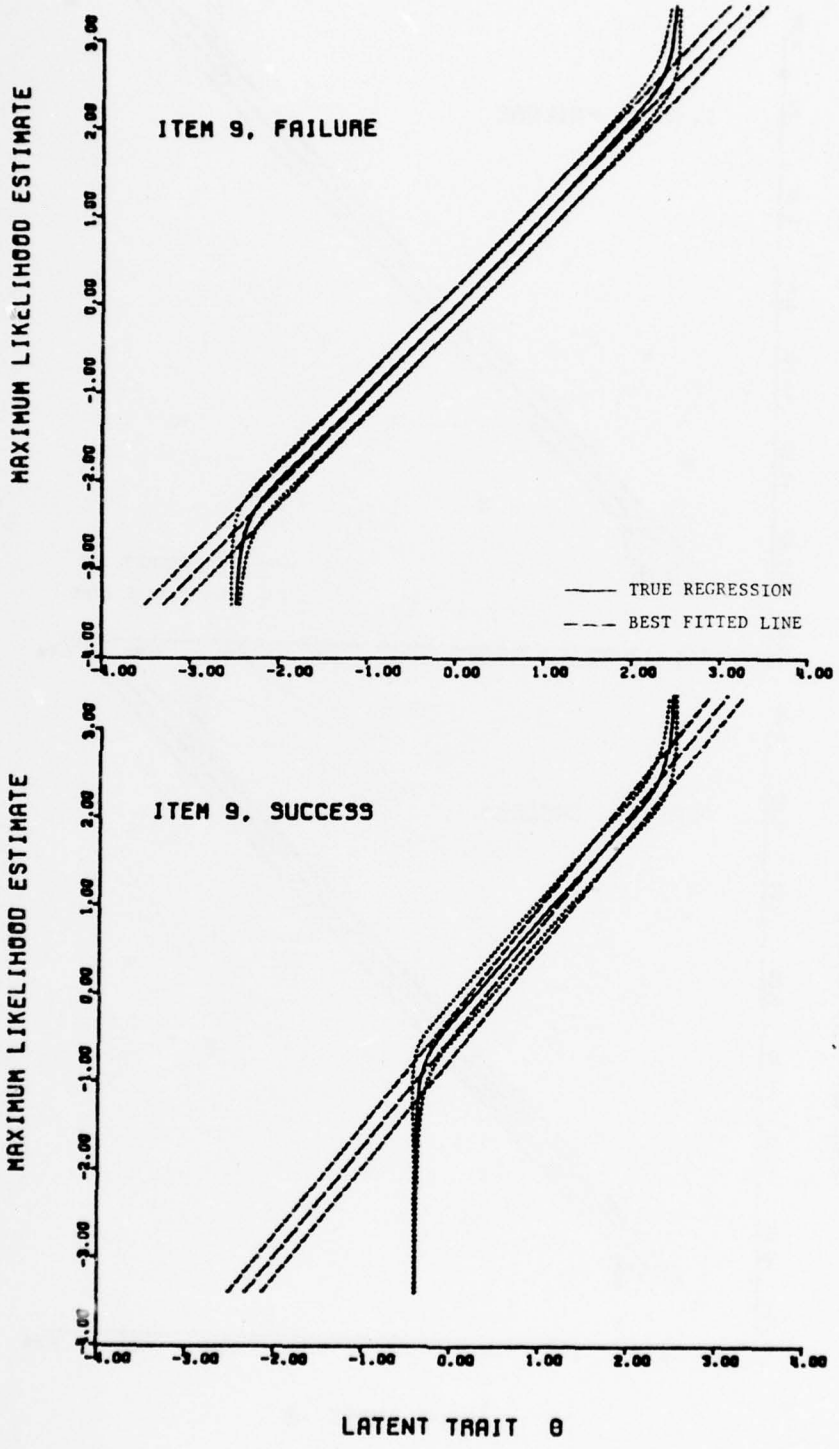

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

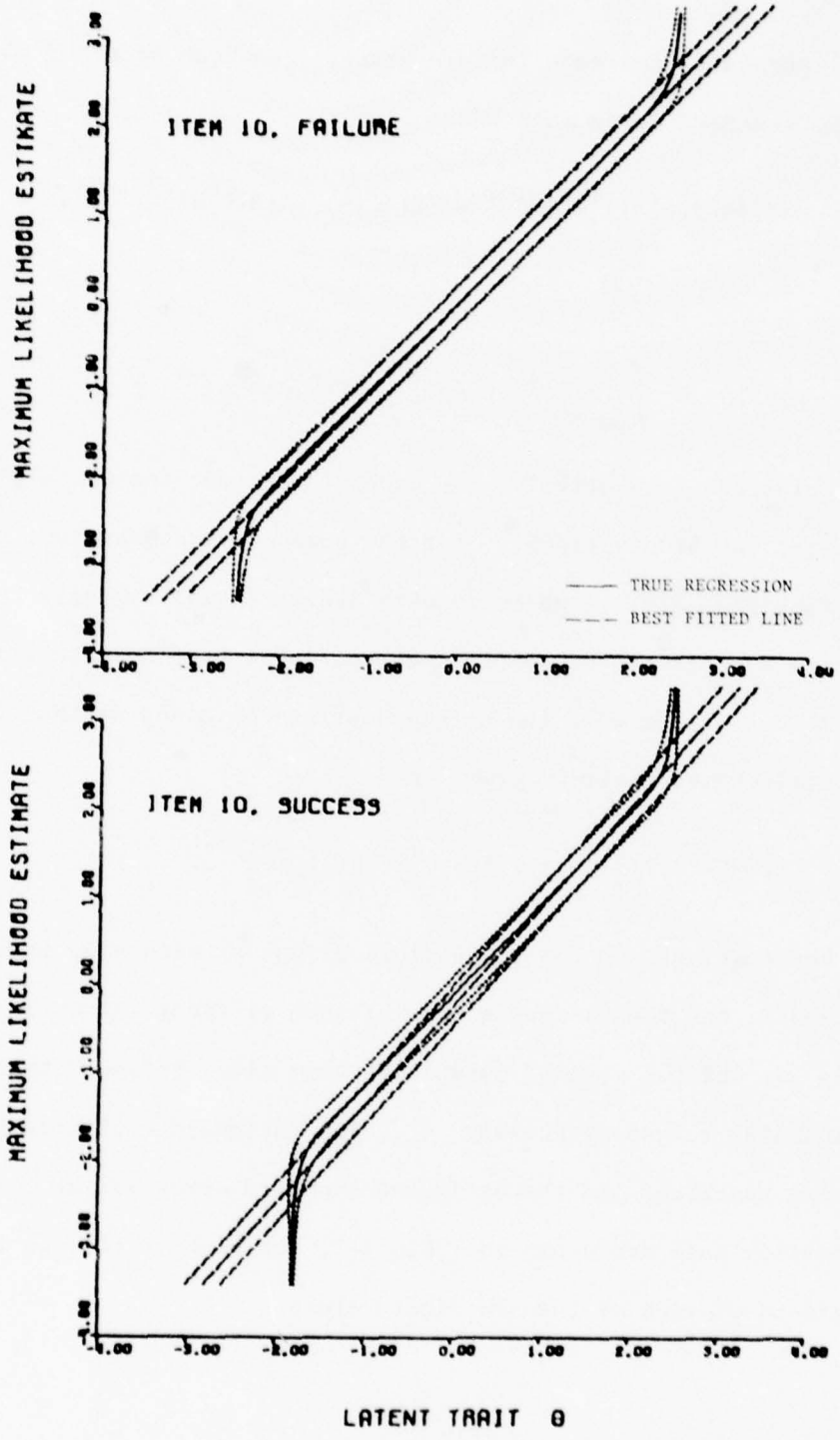

FIGURE 4-2: Comparison of Theoretical Regression of θ on $\hat{\theta}$ with the Best Fitted Line of θ on $\hat{\theta}$ (Continued)

in (4.3) and (4.4) for each failure group. On both sides of each regression, the standard error such that

$$(4.8) \qquad \{E[\{\theta-E(\theta|\hat{\theta})\}^2|\hat{\theta}]\}^{1/2} = \{E(\theta^2|\hat{\theta}) - [E(\theta|\hat{\theta})]^2\}^{1/2} ,$$

where

$$(4.9) \qquad E(\theta^2|\hat{\theta}) = \int_{-\infty}^{\infty} \theta^2 \xi(\hat{\theta},\theta)\, d\theta \Big[\int_{-\infty}^{\infty} \xi(\hat{\theta},\theta)\, d\theta \Big]^{-1} ,$$

is also plotted, respectively, for each of the two item score groups of each of the ten binary items. For the purpose of comparison, the estimated linear function $\hat{h}(\hat{\theta})$, which is obtained by (2.16) by replacing the population moments by the sample moments, is plotted in each graph of Figure 4-2, together with the standard errors obtained as the square root of the conditional variance given by

$$(4.10) \qquad [\mathrm{Var.}(\theta|\hat{\theta})]^{1/2} = \sigma[1 - \sigma^2\{\mathrm{Var}(\hat{\theta})\}^{-1}]^{1/2}.$$

We can see that, except for the failure groups of such easy items as items 1 and 2, and the success groups of such difficult items as items 8, 9 and 10, the two sets of curves are very close to each other for the meaningful ranges of ability θ. The estimated coefficients of the linear function, and the estimated standard error in the normal approximation case are shown in Table 4-2, for each of the two item score groups of each of the ten binary items.

TABLE 4-2

Coefficients of the Best Fitted Line for Ability θ on Its Maximum Likelihood Estimate $\hat{\theta}$ and Its Standard Error for Each Item Score Group of Each of the Ten Binary Items.

Binary Item	Failure			Success		
	β	α	$[\mathrm{Var}.(\theta\|\hat{\theta})]^{1/2}$	β	α	$[\mathrm{Var}.(\theta\|\hat{\theta})]^{1/2}$
1	0.65172	-0.78658	0.17357	0.97685	0.00227	0.21250
2	0.83173	-0.30637	0.19608	0.97492	0.00702	0.21229
3	0.78914	-0.40660	0.19099	0.96867	0.01488	0.21160
4	0.93598	-0.09243	0.20800	0.96905	0.01889	0.21165
5	0.92136	-0.11020	0.20637	0.95335	0.04385	0.20993
6	0.95747	-0.04449	0.21038	0.95848	0.04159	0.21049
7	0.95269	-0.04474	0.20985	0.91314	0.12401	0.20545
8	0.96802	-0.02117	0.21153	0.92538	0.10857	0.20682
9	0.96894	-0.01513	0.21163	0.79668	0.38530	0.19190
10	0.97506	-0.00732	0.21230	0.88546	0.19854	0.20231

V Results II: Estimated Density Functions of Ability θ

For each item score group of each of the ten binary items, the density function of ability θ was estimated through (3.2), by using each of the polynomials of degrees 3, 4 and 5 as the approximated density function of the maximum likelihood estimate $\hat{\theta}$, and the normal density function with the parameters estimated through (2.7) and (2.8) as the approximated conditional density function of θ, given $\hat{\theta}$. Then the resulting estimated density function of θ was multiplied by the relative frequency of the examinees having that item score, so that the sum of the areas of the two curves should make unity for each item g. Figure 5-1 presents the estimated shared density functions of ability θ thus obtained, for Degree 3, 4 and 5 Cases, for each of the failure and success groups of each of the ten binary items. In each graph of Figure 5-1, the theoretical shared density function, which is the product of the theoretical, uniform density function of θ and the operating characteristic of the item score category in question, along with the actual frequency ratios, are also drawn.

It is noted that for the failure and success groups of item 1, the failure group of item 3, and the failure and success groups of item 9, the results of Degree 3 Case are substantially different from those of Degree 4 and 5 Cases, and farther from the respective theoretical shared density functions, which are shown by solid curves in these graphs. It is also noted that for the success group of item 3 the result of Degree 5 Case is visibly closer to the theoretical shared density function, than those of Degree 3 and 4 Cases. For items with intermediate difficulties like items 4, 5, 6, 7 and 8, however, the

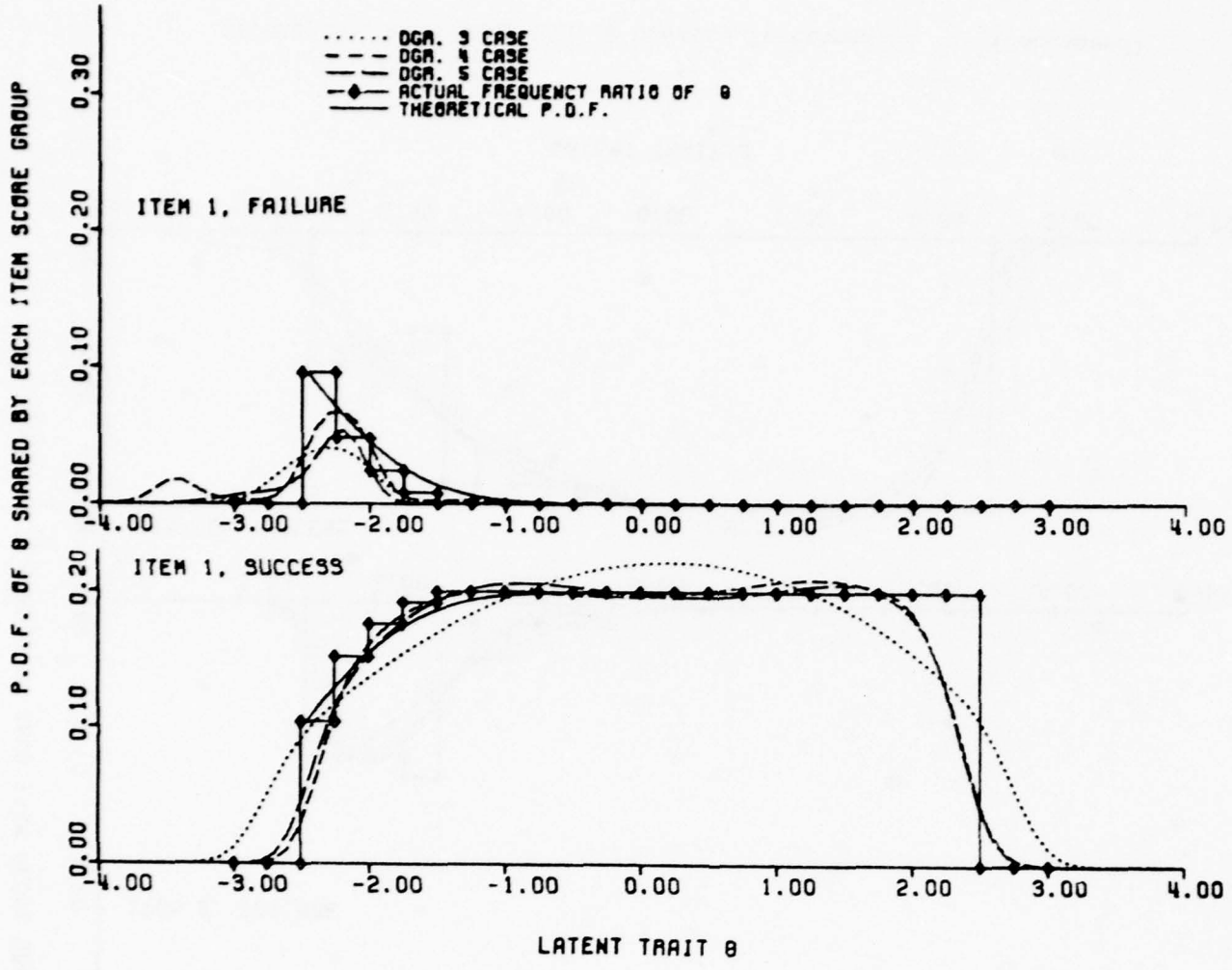

FIGURE 5-1

Estimated Shared Density Functions of Ability θ in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method, for Each Item Score Group of Each of the Ten Binary Items. Actual Frequencies and the Theoretical Shared Density Function Are Also Presented.

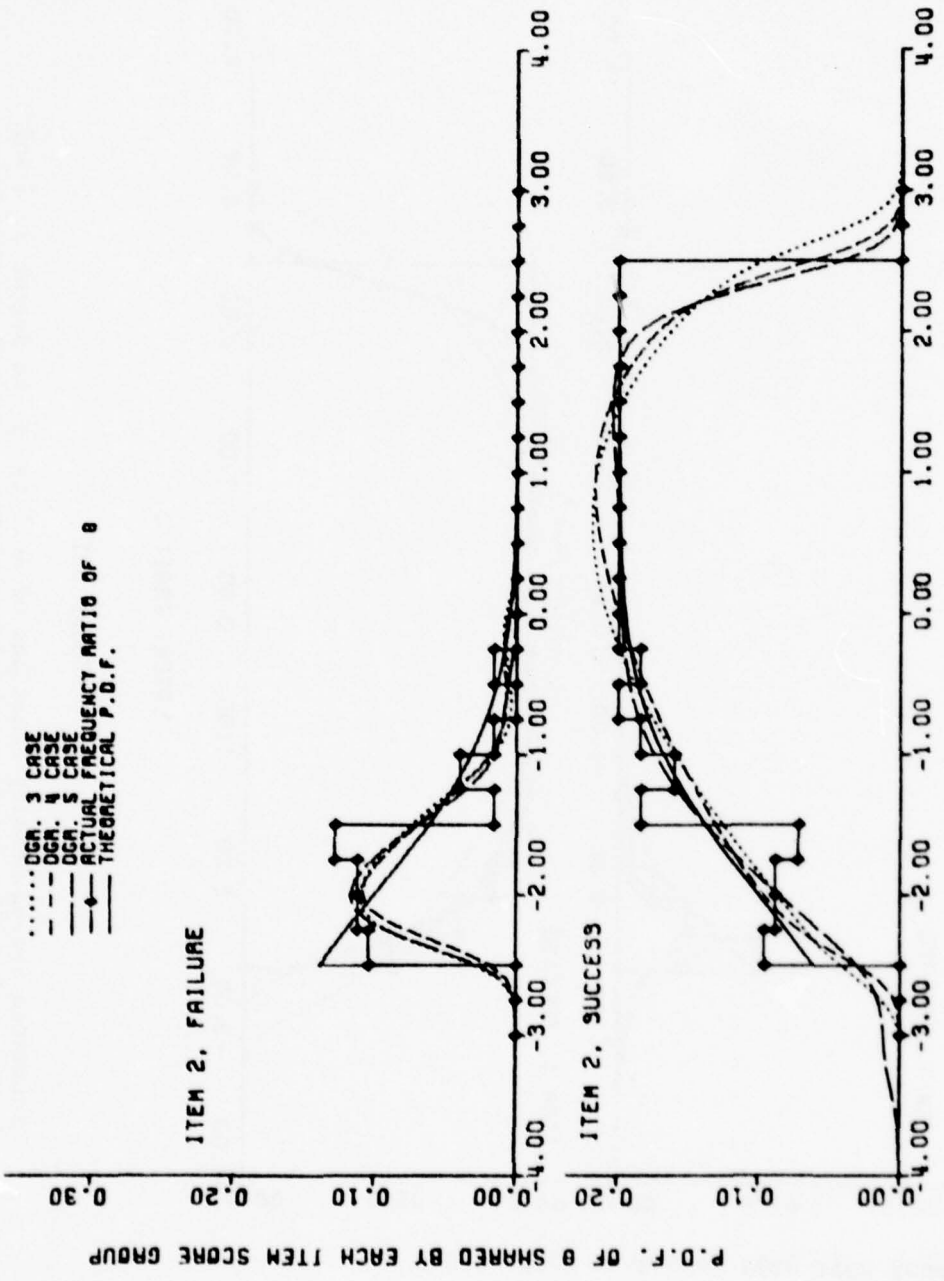

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

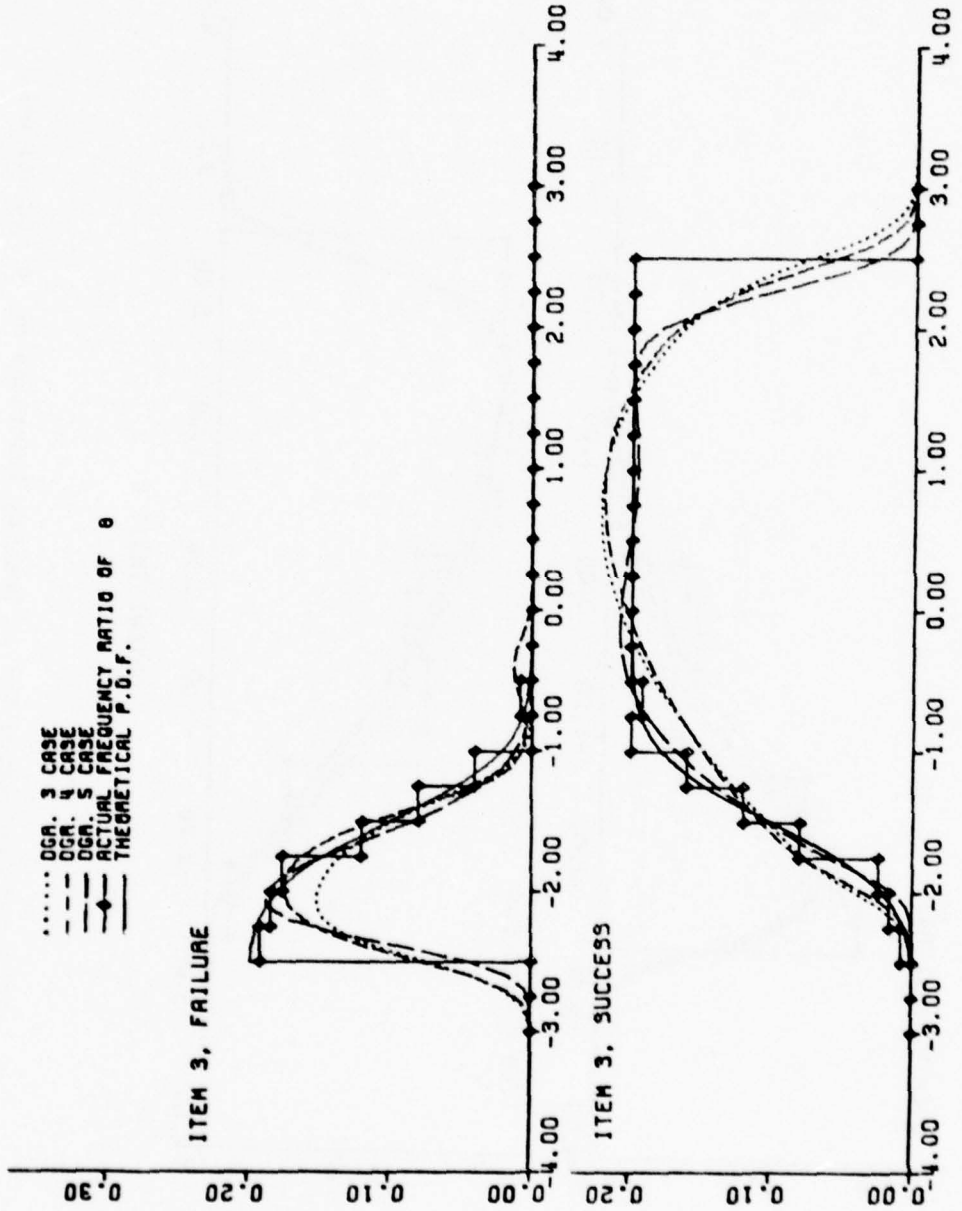

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

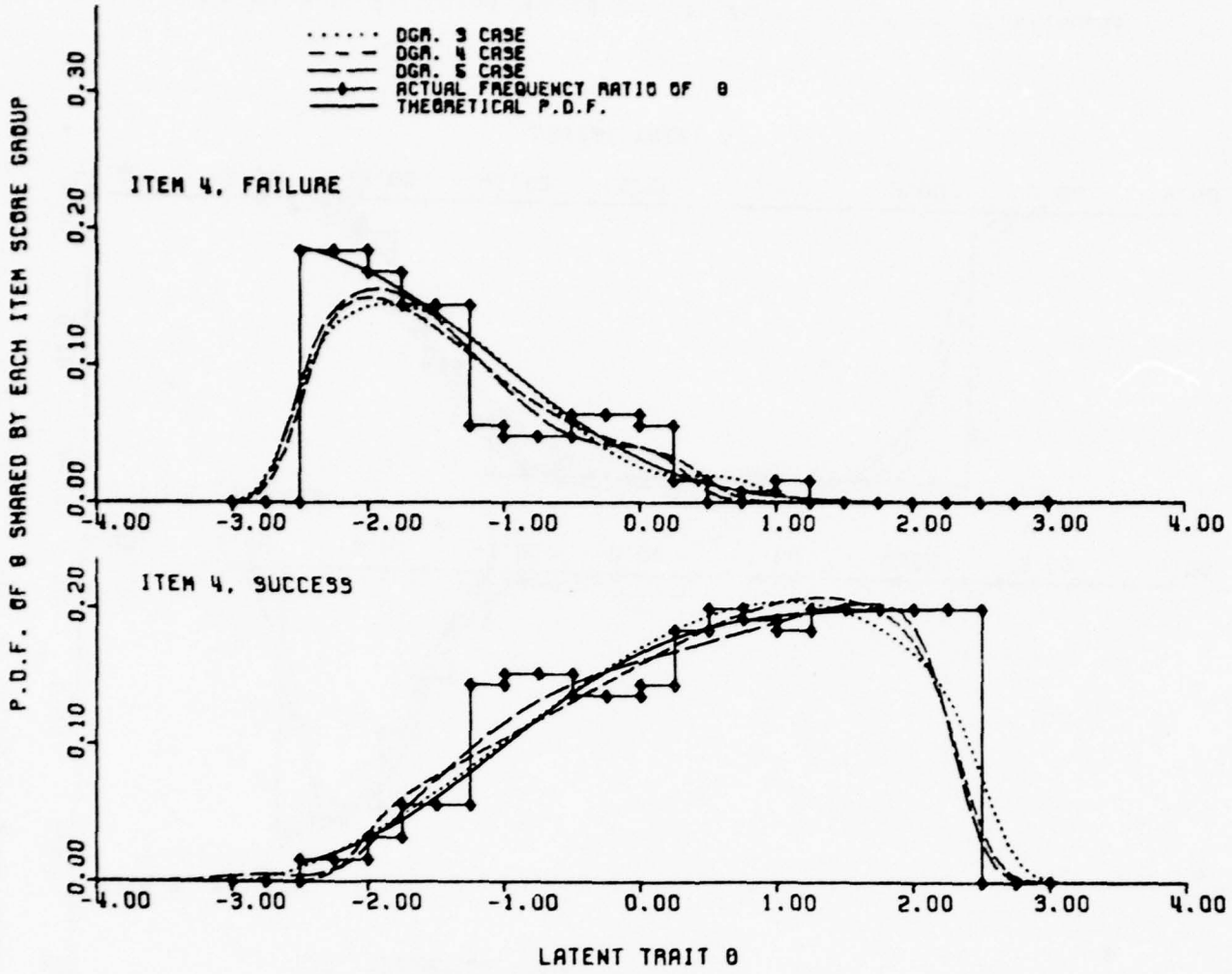

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

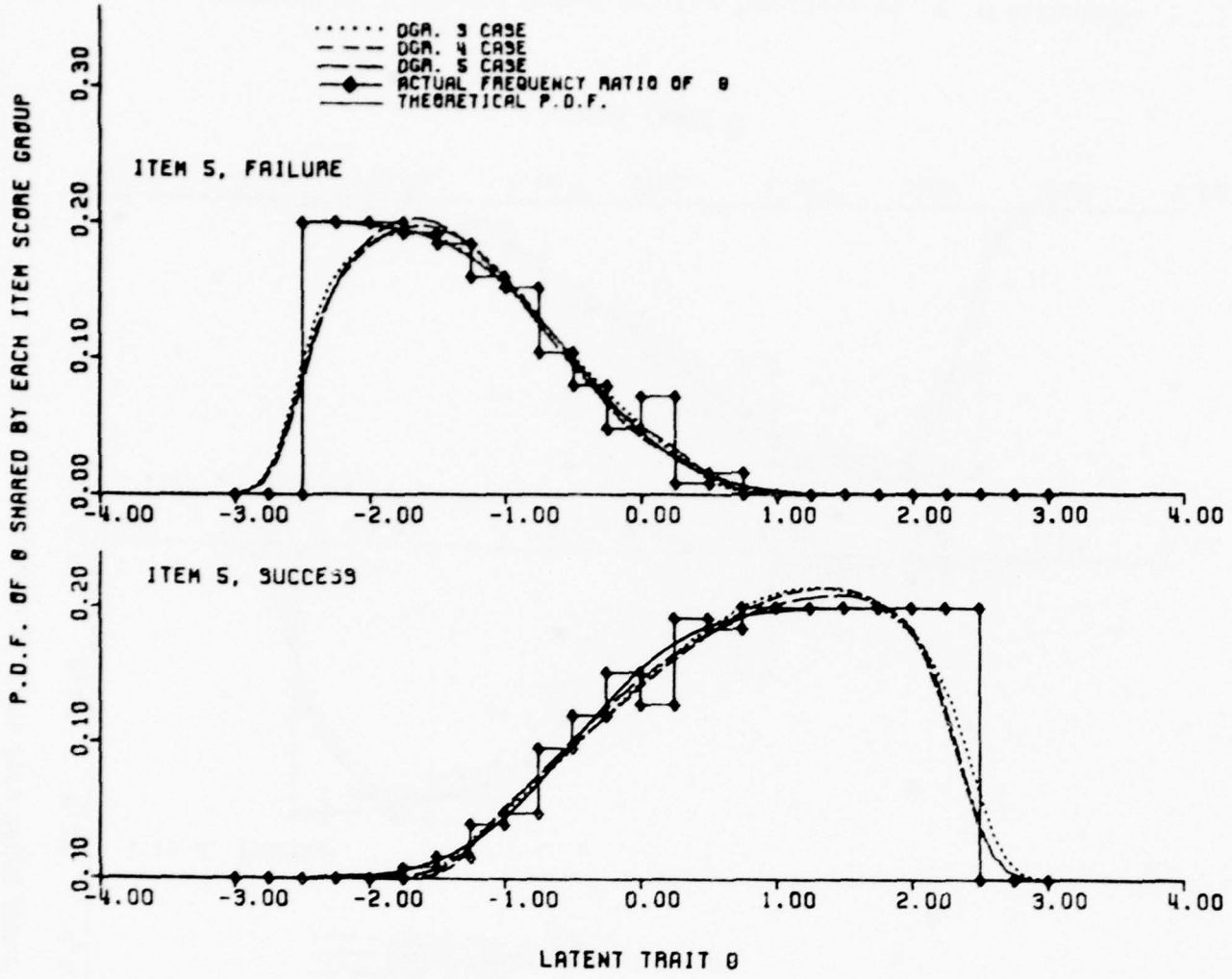

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

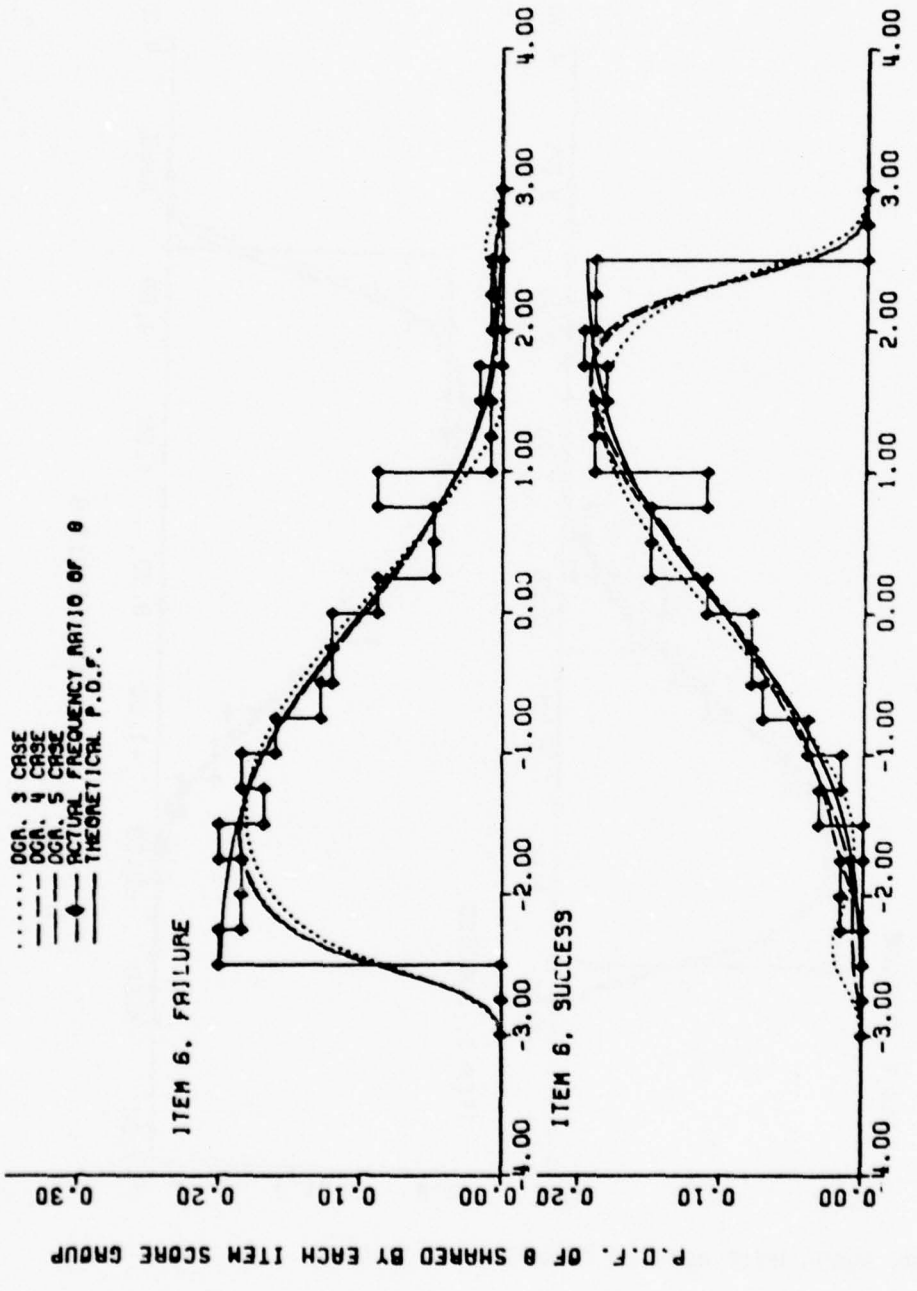

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

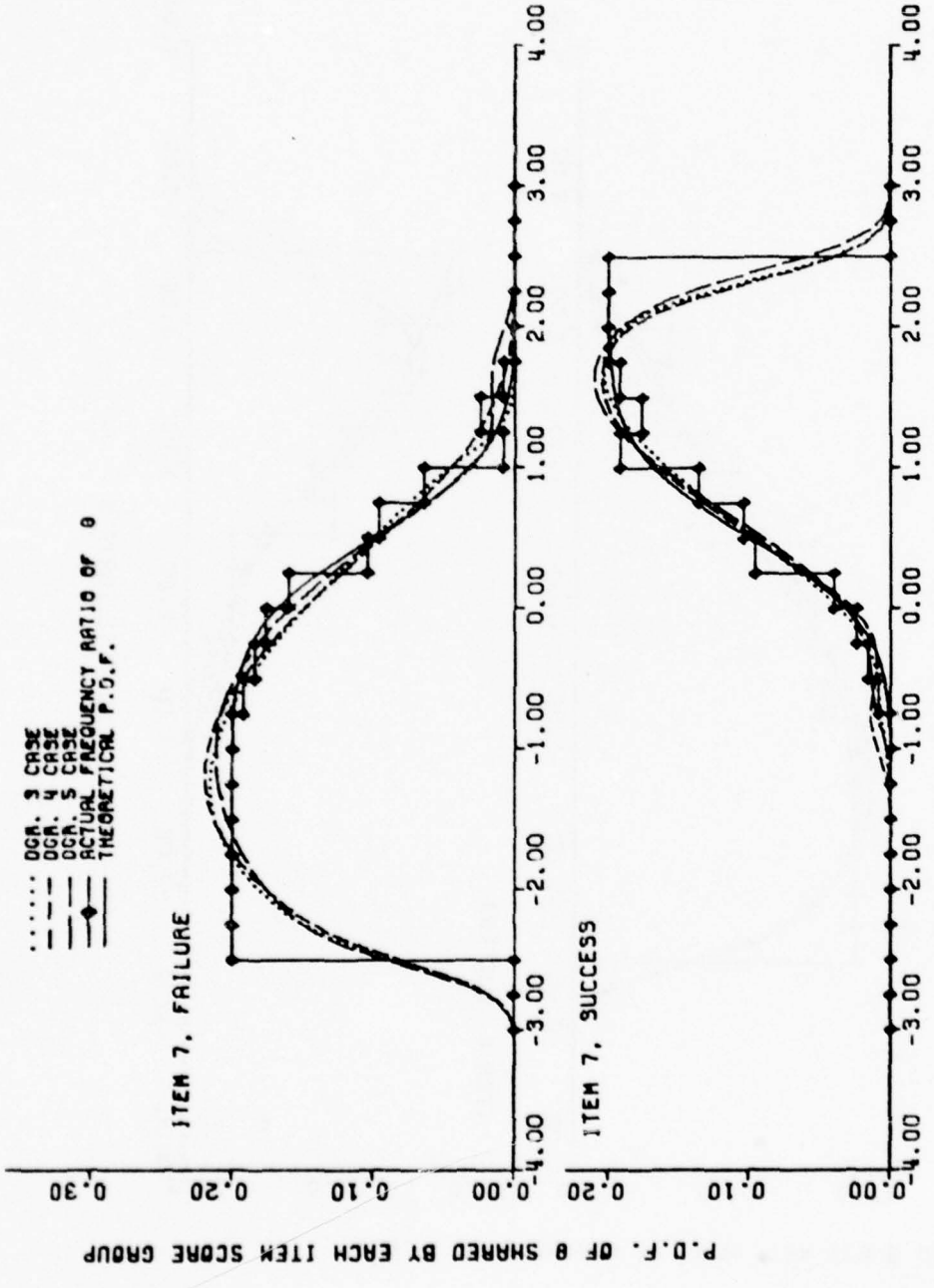

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

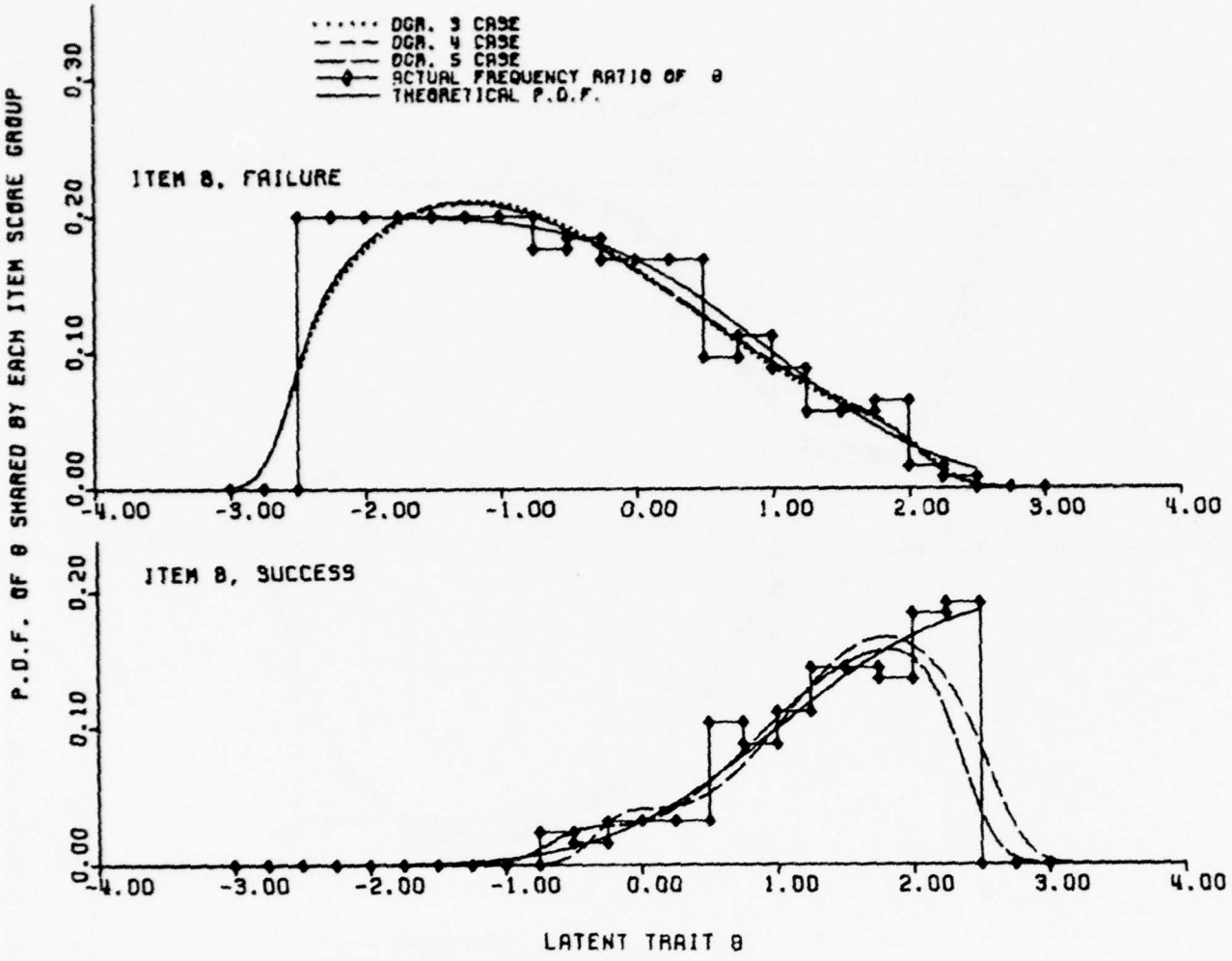

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

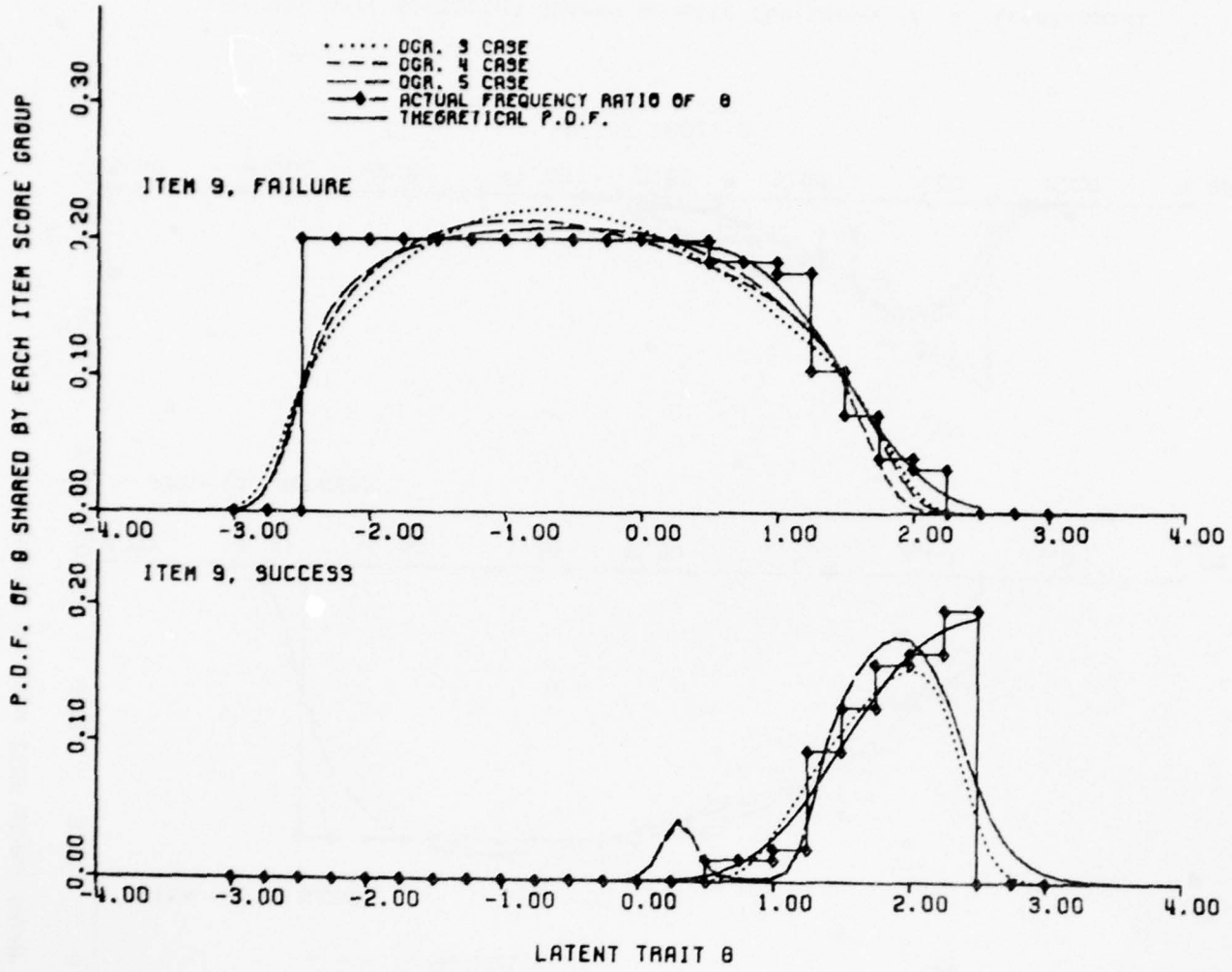

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

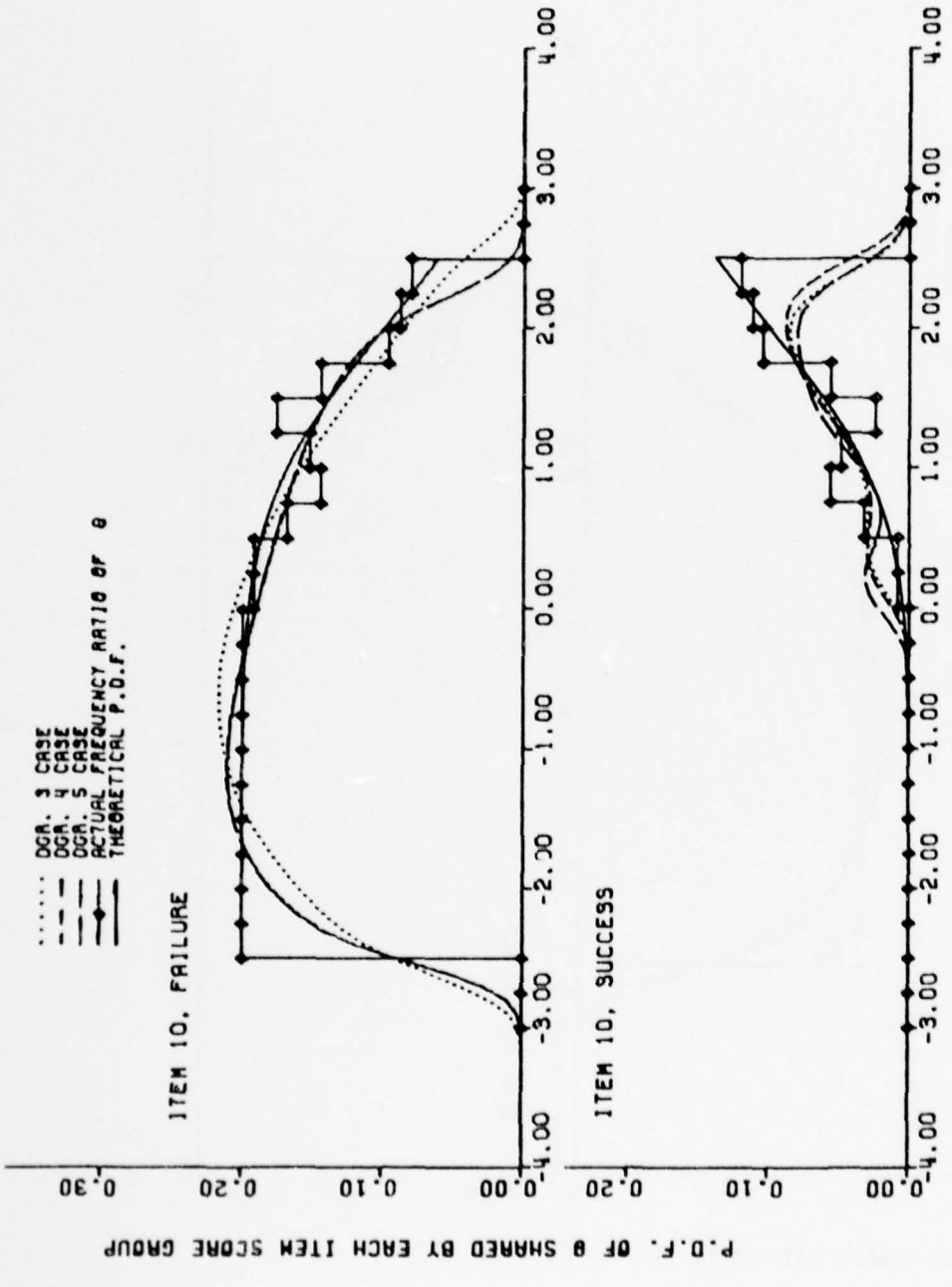

FIGURE 5-1: Estimated Shared Density Functions of θ (Continued)

results of Degree 3, 4 and 5 Cases are fairly close to one another, and no conspicuous superiority of Degree 5 Case nor inferiority of Degree 3 Case is observed.

The sum of the two estimated shared density functions of θ for each item gives an estimated density function of θ for the total group of examinees. Figure 5-2 presents these ten estimated density functions of θ for Degree 3, 4 and 5 Cases respectively, together with the theoretical density $f(\theta)$. In these graphs, the curves are plotted only for the interval [-2.5, 2.5], but, actually, all these estimated density functions of θ have two "tails" outside of the interval, as we can see from Figure 5-1. It is interesting to note that these ten estimated density functions of θ are substantially different in shape. If, for instance, we compare the two results obtained on items 3 and 9, respectively, we find that these two sets of curves are opposite with respect to the locations of "hills" and "valleys." In cases like those based on items 1, 4, 6, 9 and 10, the curves in Degree 4 and 5 Cases are closer to each other compared with the one in Degree 3 Case, while in some other cases like those based on items 2, 3 and 8 those in Degree 3 and 4 Cases are closer to each other. The mean square error is calculated by

$$(5.1) \qquad \frac{1}{m} \sum_{j=1}^{m} [\hat{f}(\theta_j) - f(\theta_j)]^2 \quad ,$$

with $m = 25$ and θ_j's taken from -2.4 to 2.4 with the step of 0.2. Table 5-1 presents these mean square errors of the estimated density functions based on the ten binary items, and in Degree 3, 4 and 5 Cases, respectively, together with the corresponding result obtained from the criterion density function of the Simple Sum Procedure (SSP) of the Conditional P.D.F. Approach (Samejima, 1978b). The square roots of

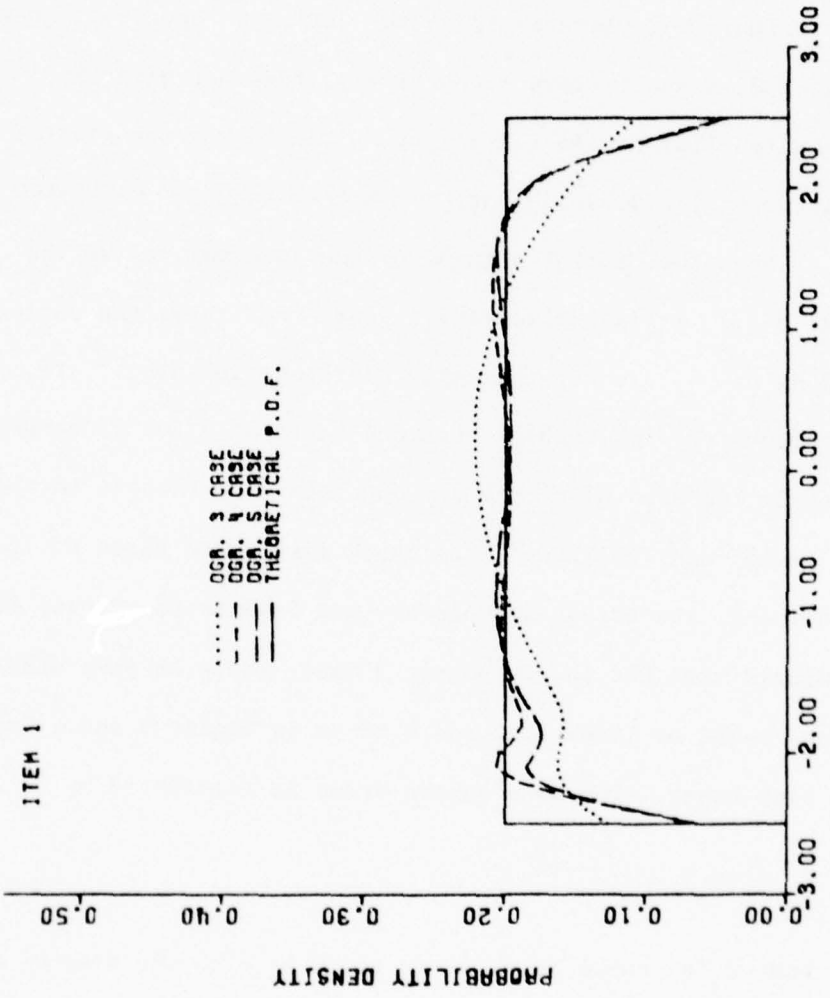

FIGURE 5-2

Estimated Density Functions of Ability θ in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method. The Theoretical Density Function Is Also Drawn for Comparison.

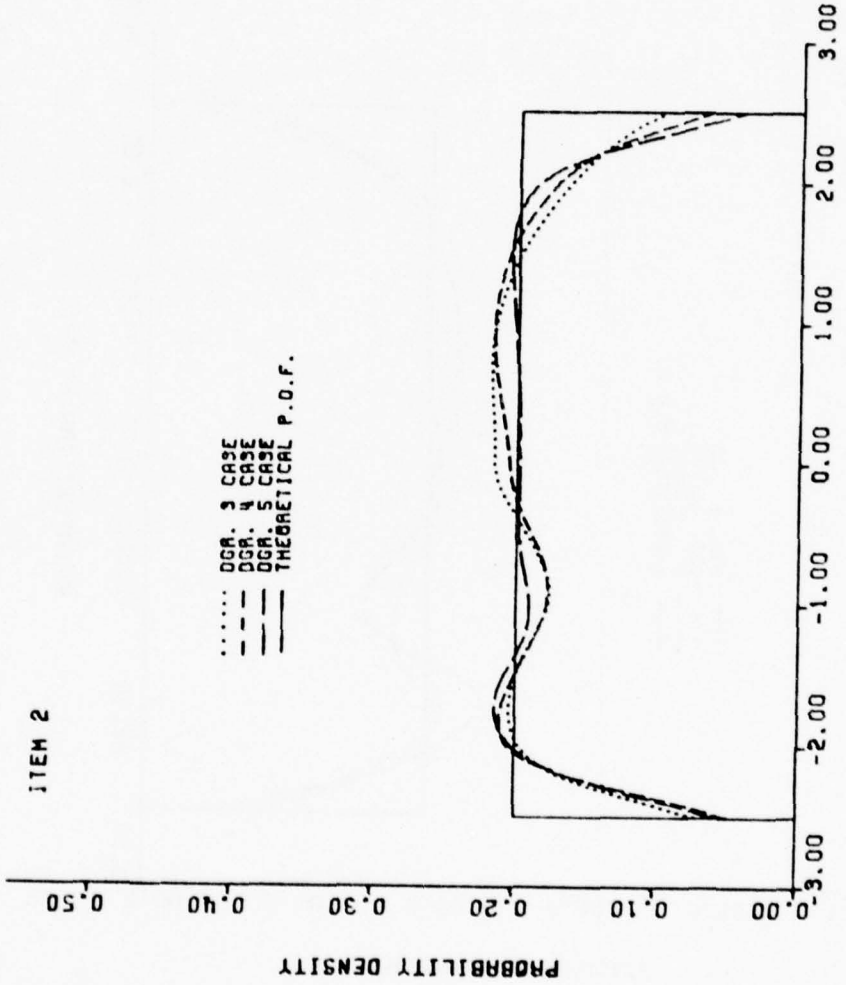

FIGURE 5-2: Estimated Density Functions of θ (Continued)

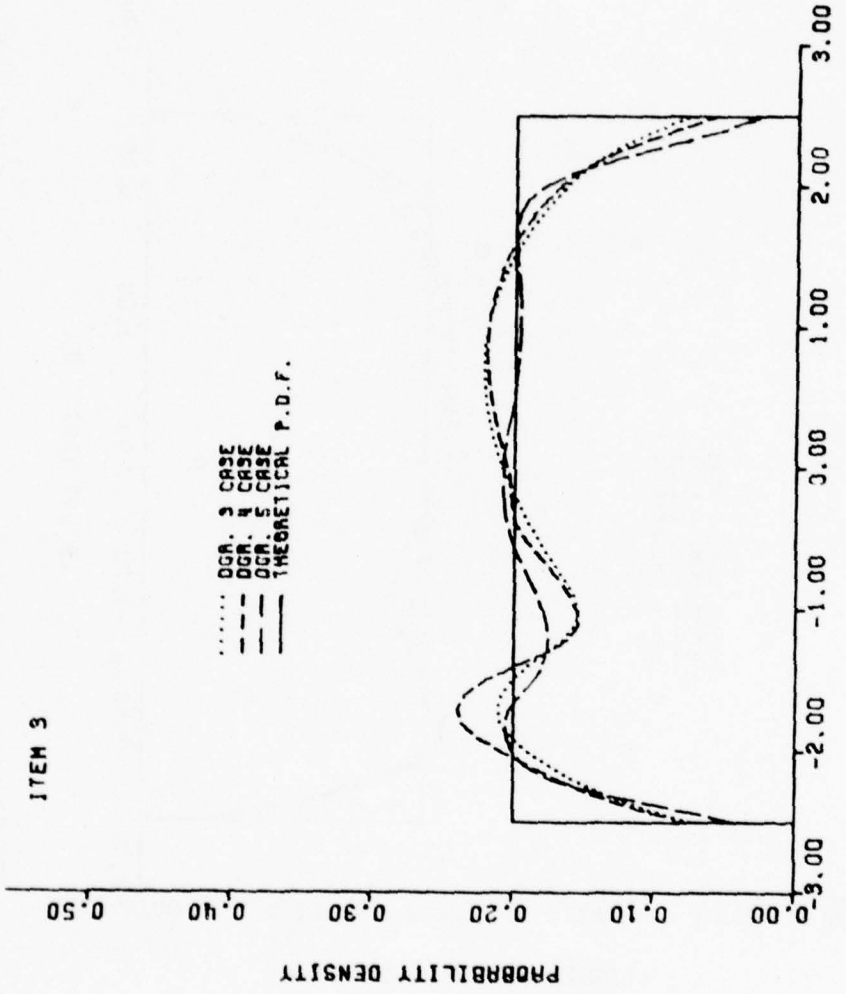

FIGURE 5-2: Estimated Density Functions of θ (Continued)

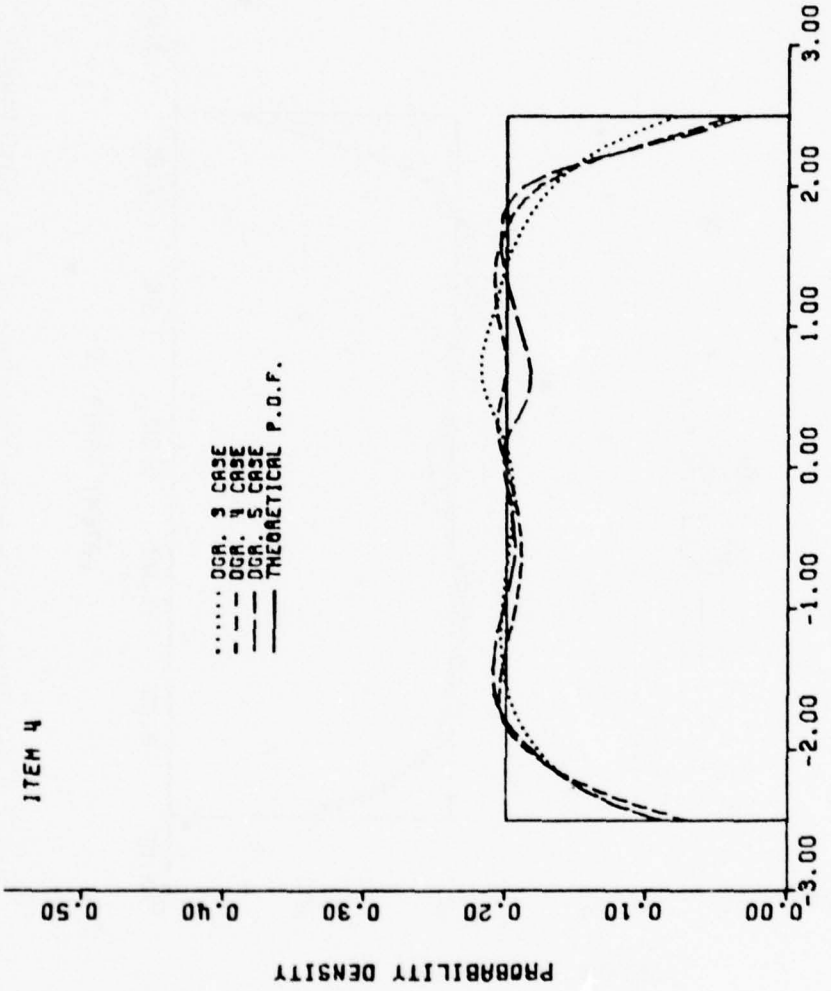

FIGURE 5-2: Estimated Density Functions of θ (Continued)

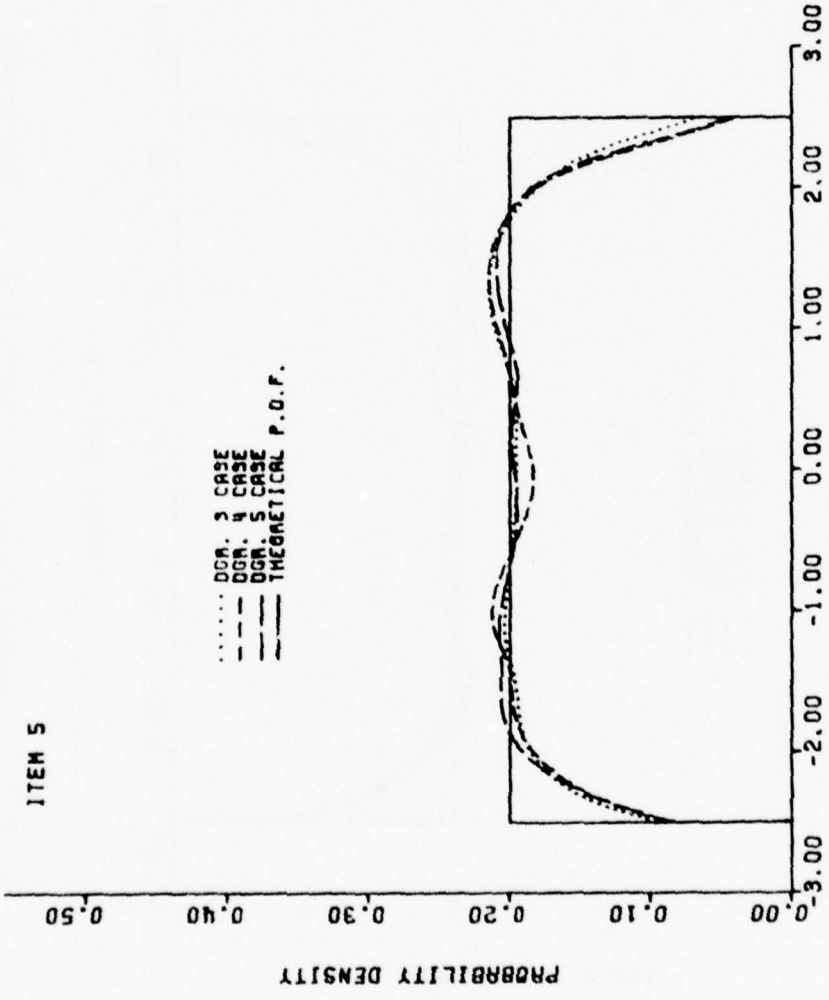

FIGURE 5-2: Estimated Density Functions of θ (Continued)

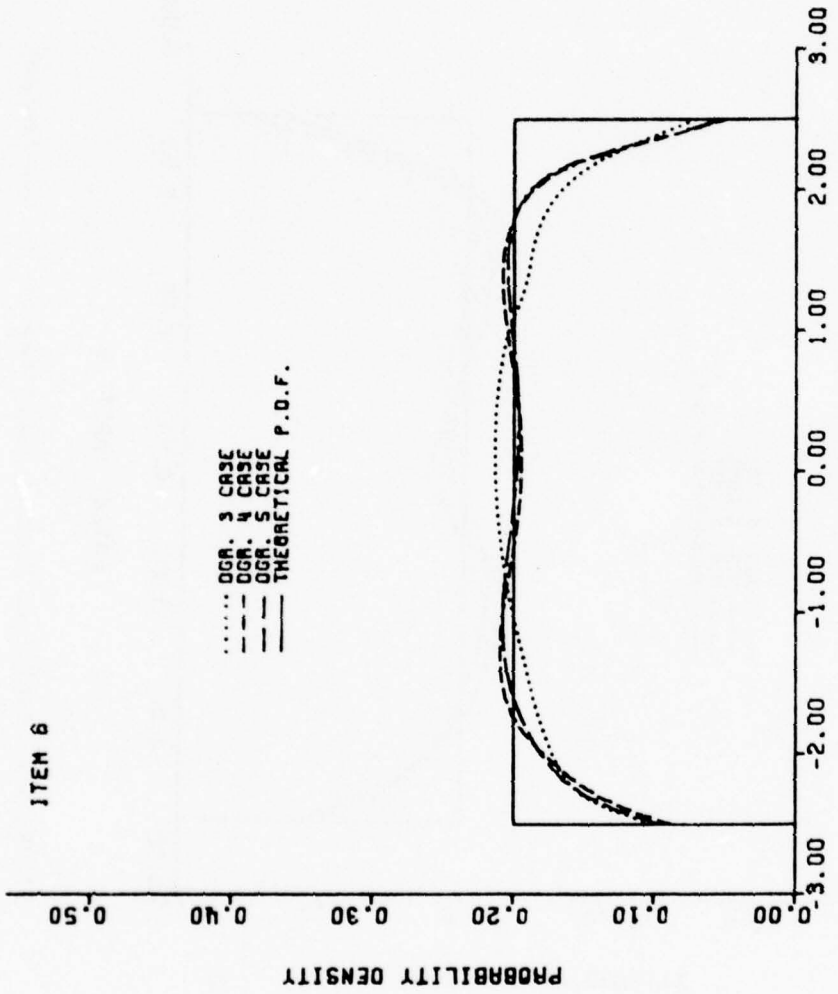

FIGURE 5-2: Estimated Density Functions of θ (Continued)

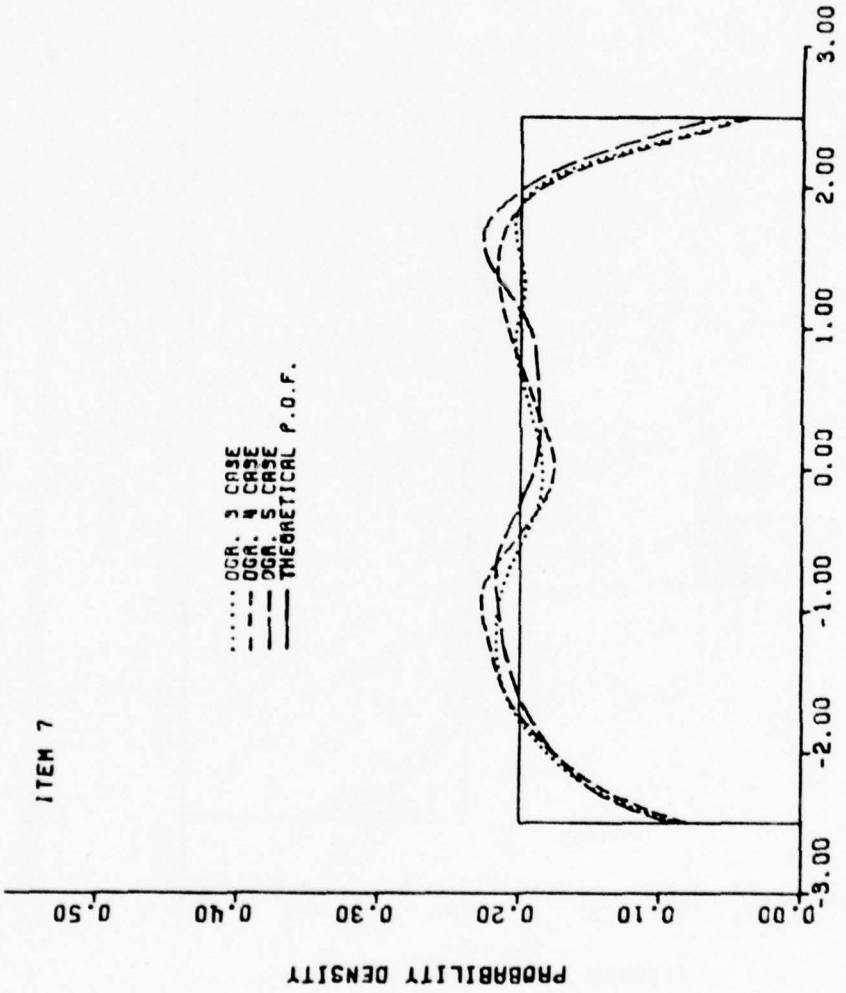

FIGURE 5-2: Estimated Density Functions of θ (Continued)

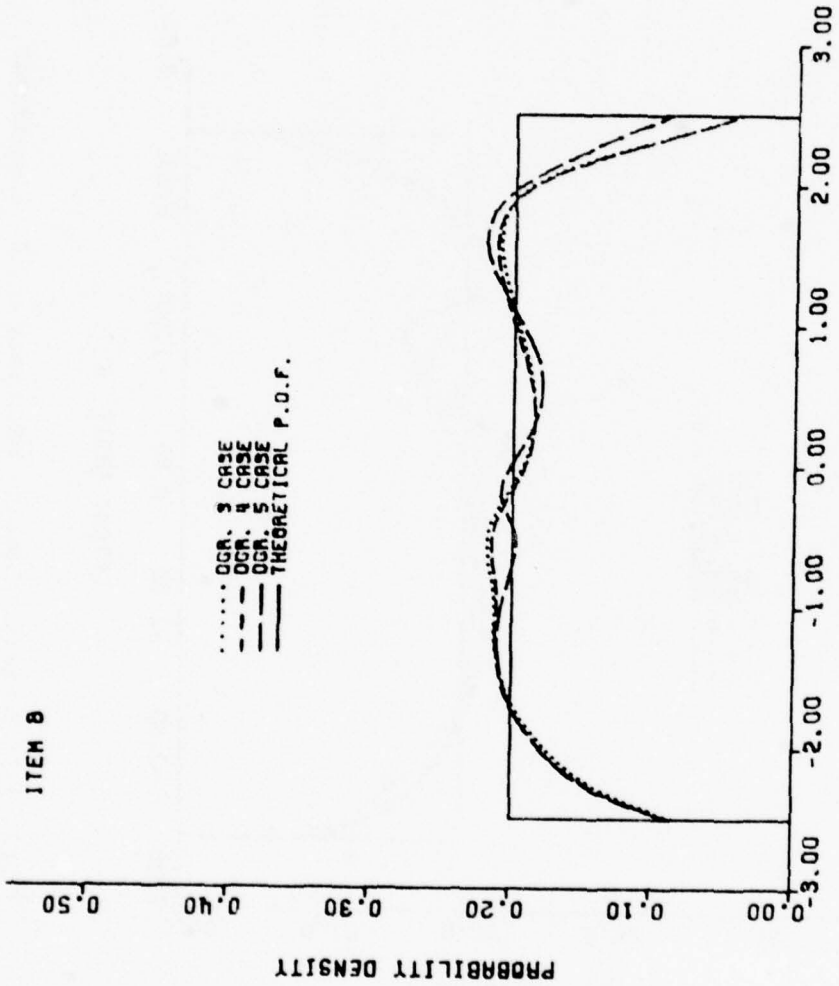

FIGURE 5-2: Estimated Density Functions of θ (Continued)

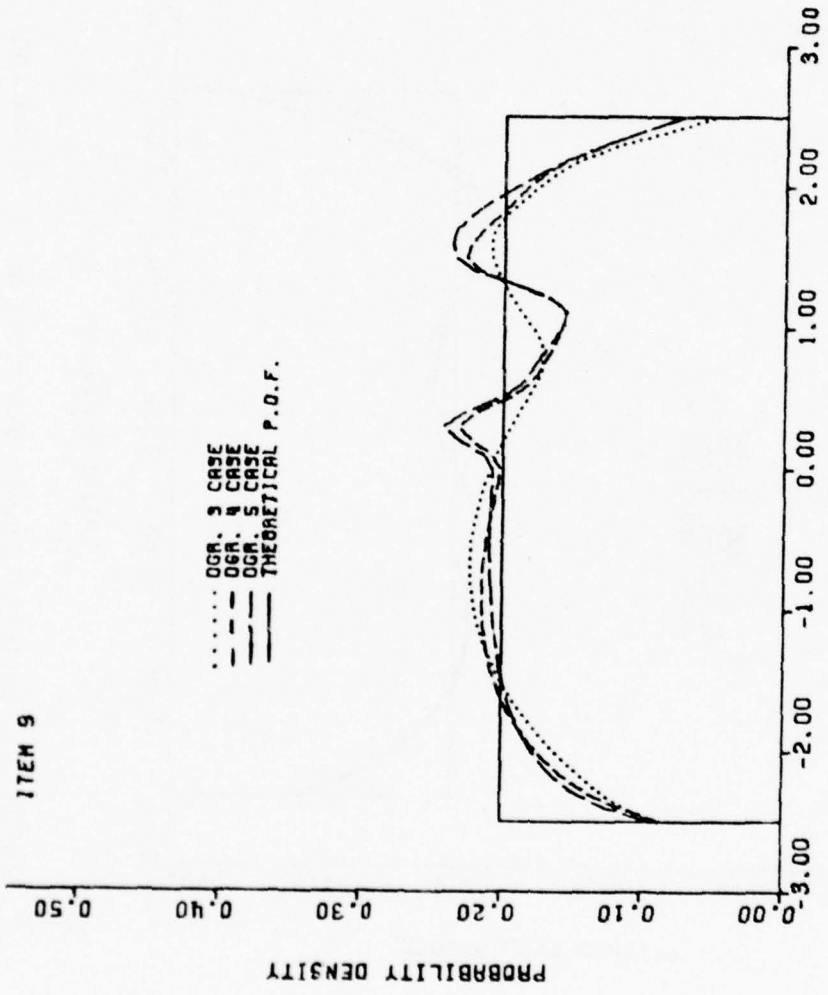

FIGURE 5-2: Estimated Density Functions of θ (Continued)

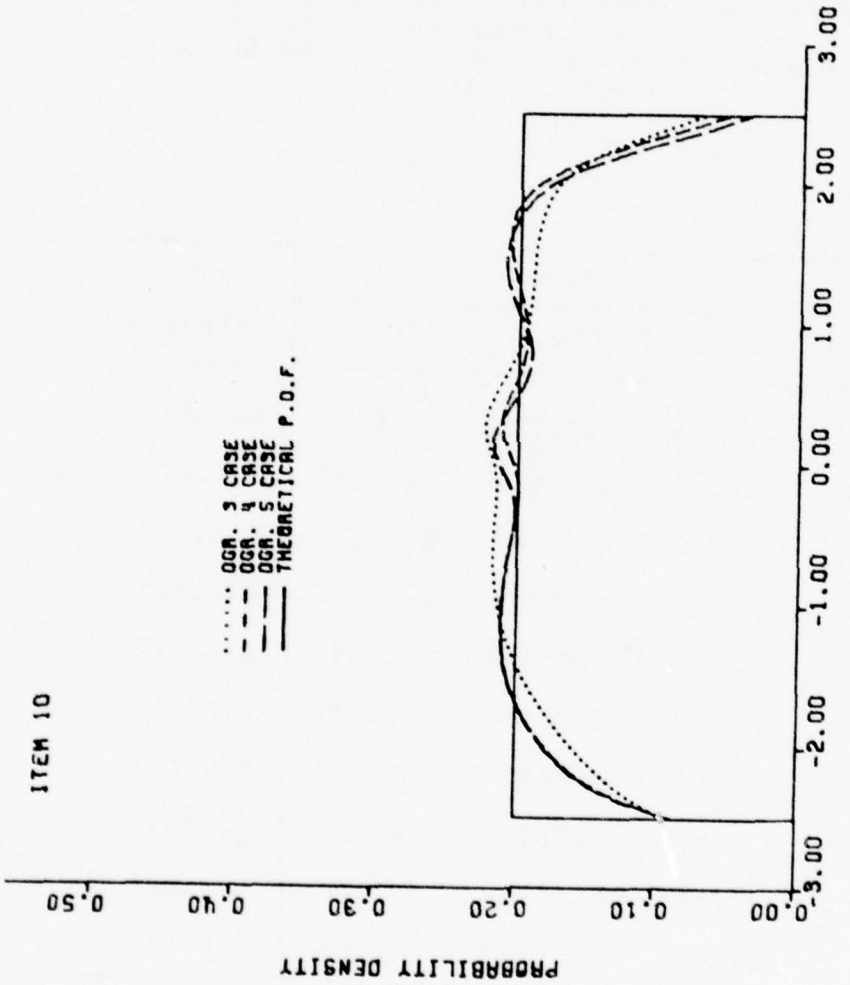

FIGURE 5-2: Estimated Density Functions of θ (Continued)

TABLE 5-1

Mean Square Errors of the Estimated Density Functions of Ability θ in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method (BNAM), Compared with the Mean Square Error for the Criterion Density Function of the Simple Sum Procedure (SSP) of the Conditional P.D.F. Approach.

	BNAM			SSP
ITEM	DGR.3	DGR.4	DGR.5	CRITERION
1	0.00106	0.00105	0.00118	0.00017
2	0.00100	0.00128	0.00129	0.00017
3	0.00134	0.00143	0.00172	0.00017
4	0.00094	0.00137	0.00136	0.00017
5	0.00081	0.00126	0.00113	0.00017
6	0.00100	0.00104	0.00090	0.00017
7	0.00119	0.00147	0.00099	0.00017
8	0.00132	0.00130	0.00082	0.00017
9	0.00140	0.00118	0.00113	0.00017
10	0.00126	0.00107	0.00134	0.00017

TABLE 5-2

Square Roots of the Mean Square Errors of the Estimated Density Functions of Ability θ in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method (BNAM), Compared with the Mean Square Error for the Criterion Density Function of the Simple Sum Procedure (SSP) of the Conditional P.D.F. Approach.

ITEM	BNAM			SSP
	DGR.3	DGR.4	DGR.5	CRITERION
1	0.03256	0.03240	0.03431	0.01316
2	0.03167	0.03583	0.03590	0.01316
3	0.03667	0.03778	0.04146	0.01316
4	0.03062	0.03706	0.03683	0.01316
5	0.02846	0.03550	0.03355	0.01316
6	0.03169	0.03226	0.03004	0.01316
7	0.03452	0.03836	0.03147	0.01316
8	0.03637	0.03599	0.02856	0.01316
9	0.03746	0.03440	0.03367	0.01316
10	0.03547	0.03276	0.03663	0.01316

these mean square errors are also given in Table 5-2, which are more direct measures of the discrepancies of the estimated density functions from the true density function of ability θ . It is observed that all these measures of discrepancies are between two and four times greater than that of the criterion density function of the Simple Sum Procedure of the Conditional P.D.F. Approach, and yet they are small enough compared with the true density of 0.2 . There is no evidence to indicate the superiority of Degree 5 Case, nor to indicate the inferiority of Degree 3 Case, in these results.

VI Results III: Estimated Item Characteristic Functions

The item characteristic function for each of the ten binary items was estimated through (3.3), for each of Degree 3, 4 and 5 Cases. Figure 6-1 shows these three estimated item characteristic functions, together with the true item characteristic function and the frequency ratios of the examinees who answered correctly to the total number of examinees, which is uniformly twenty-five, for each subinterval of ability θ with the width of 0.25 . It is observed that in most cases these estimated item characteristic functions are close enough to the true item characteristic functions, and much closer than the actual frequency ratios. The mean square errors obtained by

$$(6.1) \qquad \frac{1}{m} \sum_{j=1}^{m} [\hat{P}_g(\theta) - P_g(\theta)]^2 \quad ,$$

with $m = 25$ and θ_j's taken from -2.4 to 2.4 with the step of 0.2 are calculated, and these results and their square roots are presented in Tables 6-1 and 6-2, respectively. In these tables, the corresponding results of the criterion item characteristic functions of the Simple Sum Procedure of the Conditional P.D.F. Approach and those of the actual frequency ratios are also shown for comparison. (In the case of the actual frequency ratios, $m = 20$ and θ_j's are the midpoints of the twenty subintervals obtained by dividing the interval $[-2.5, 2.5]$ with equal steps of 0.25 .) It is interesting to note that these measures of discrepancies of the estimated item characteristic functions from the true item characteristic functions not only tend to be less than those for the actual frequency ratios but also tend to be less than those for the criterion item characteristic functions of the Simple Sum Procedure of the Conditional P.D.F. Approach. A more precise observation

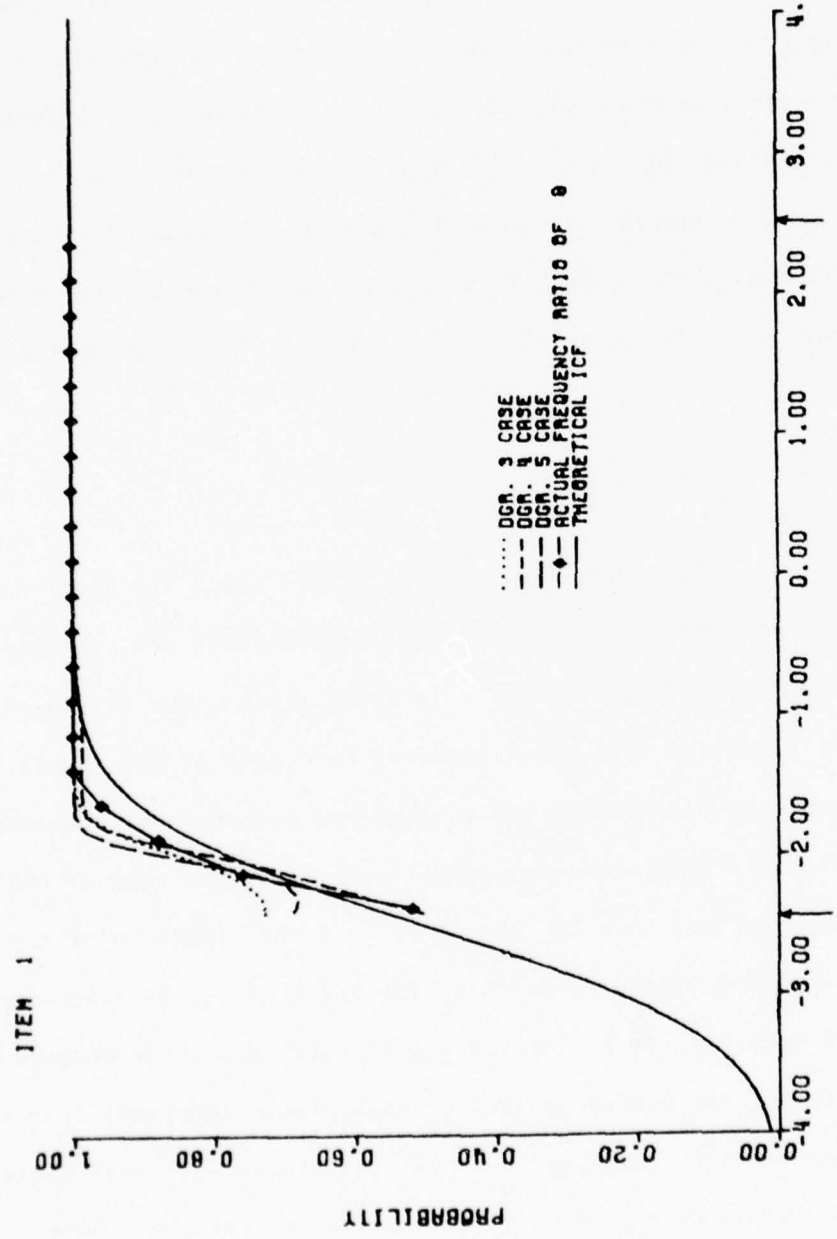

FIGURE 6-1

Estimated Item Characteristic Functions in Degree 3, 4 and 5 Cases by the Bivariate Normal Approach Method, Compared with the Theoretical Item Characteristic Function and the Actual Frequency Ratios, for Each of the Ten Binary Items.

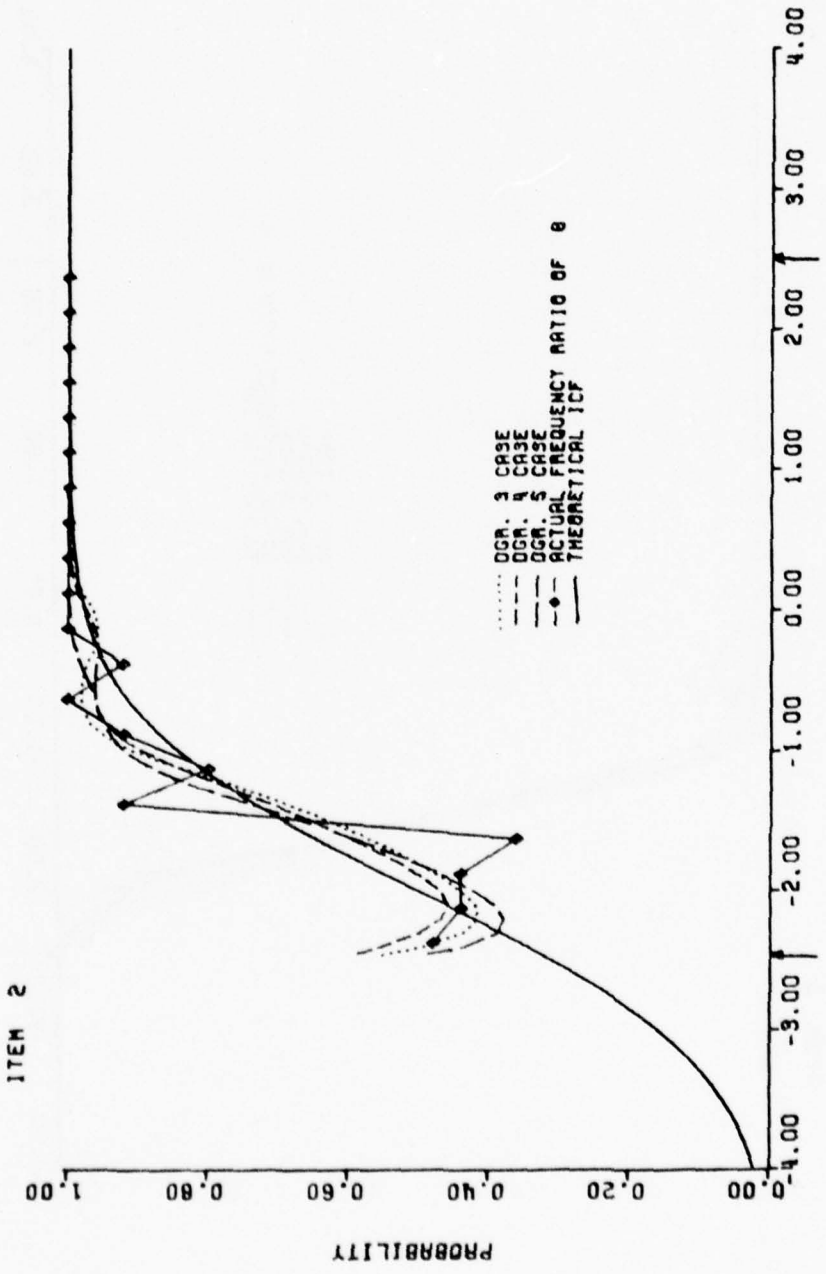

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

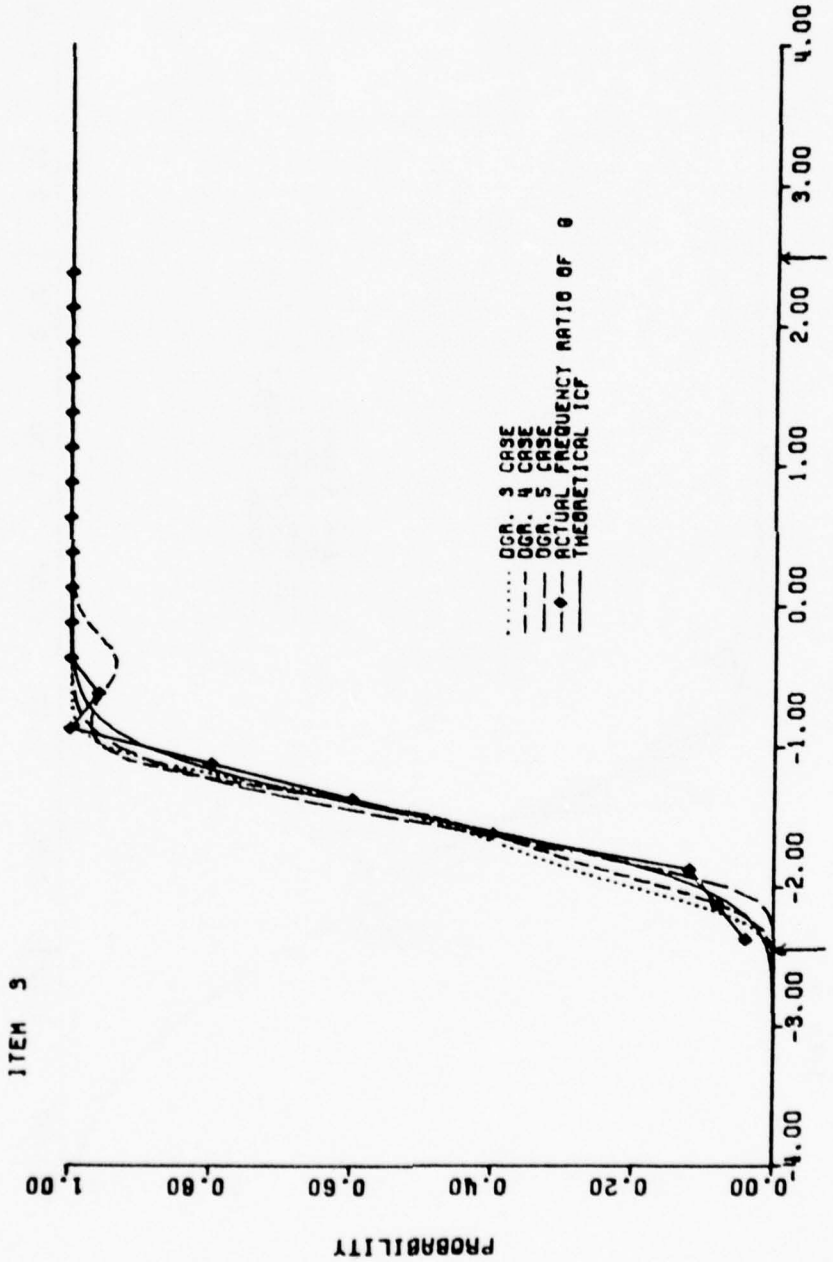

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

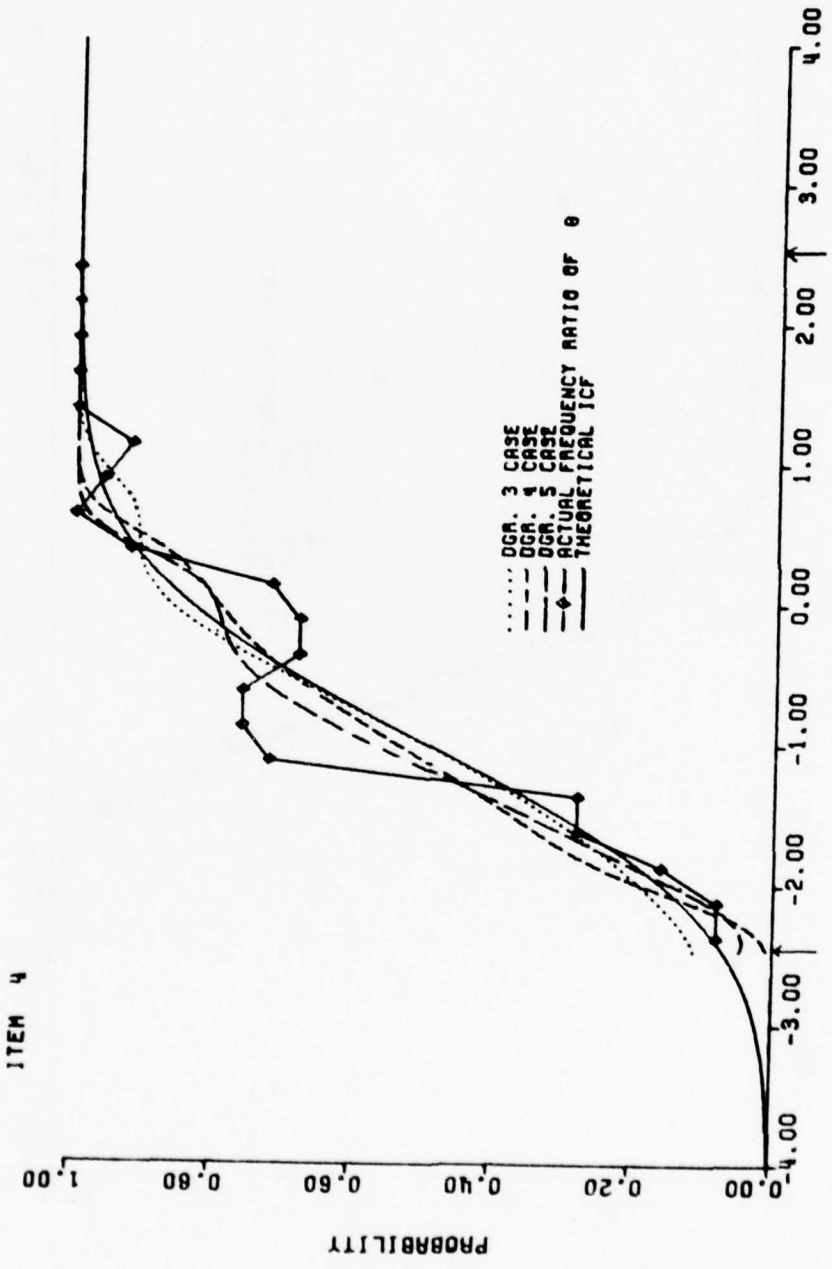

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

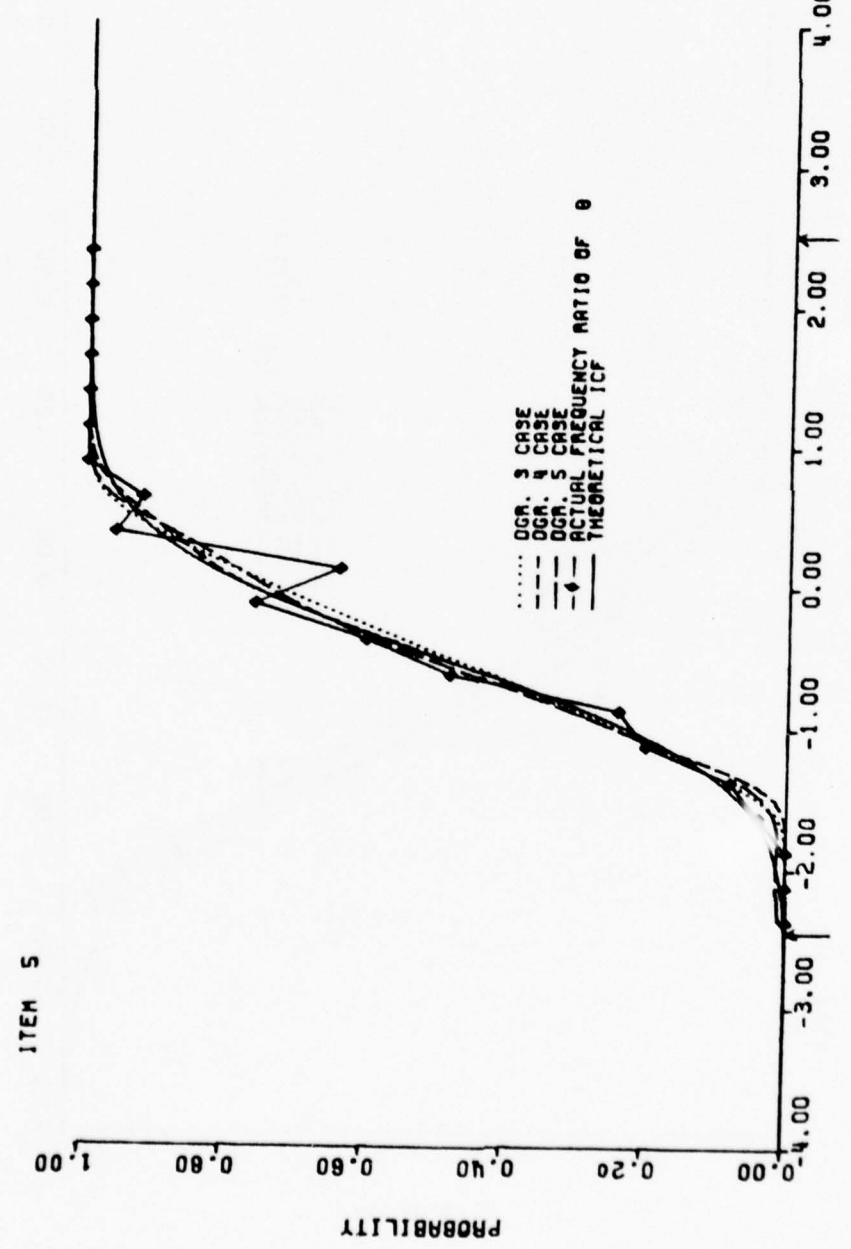

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

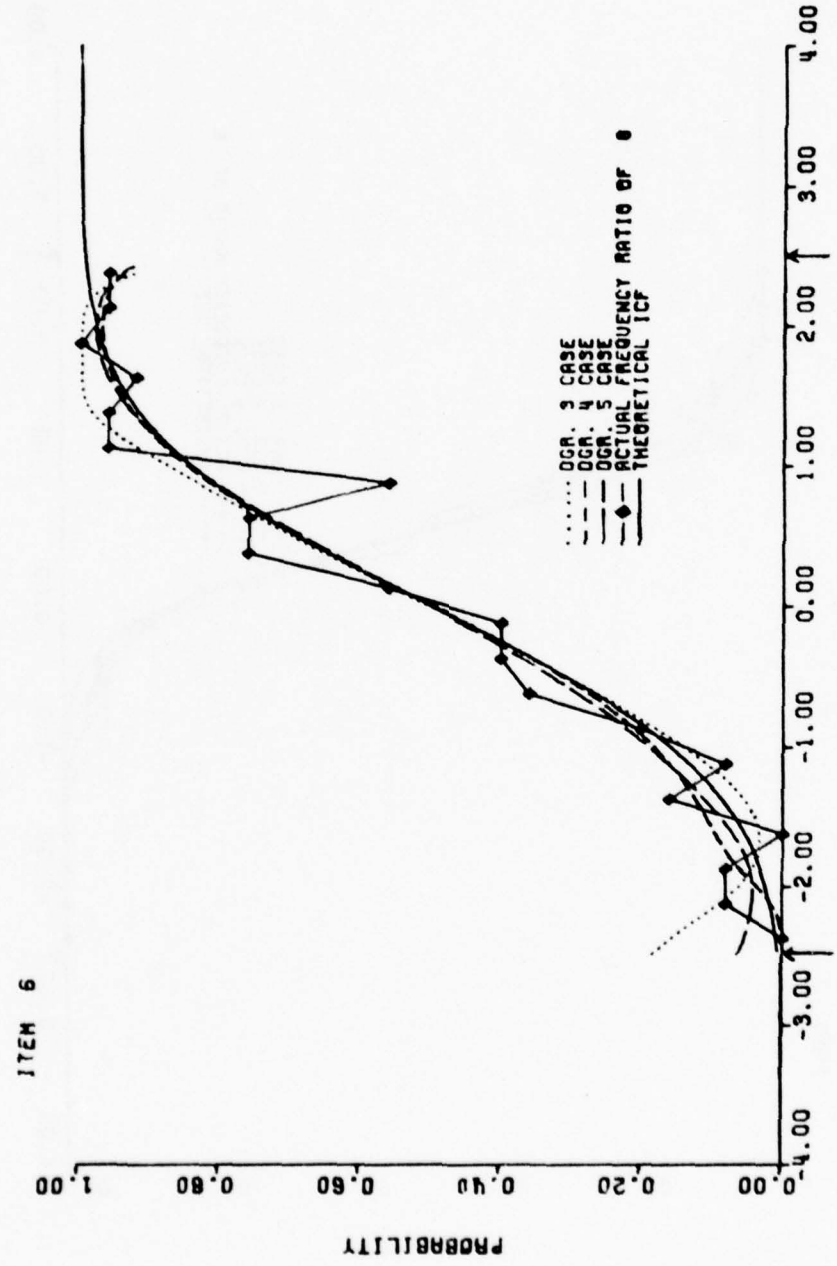

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

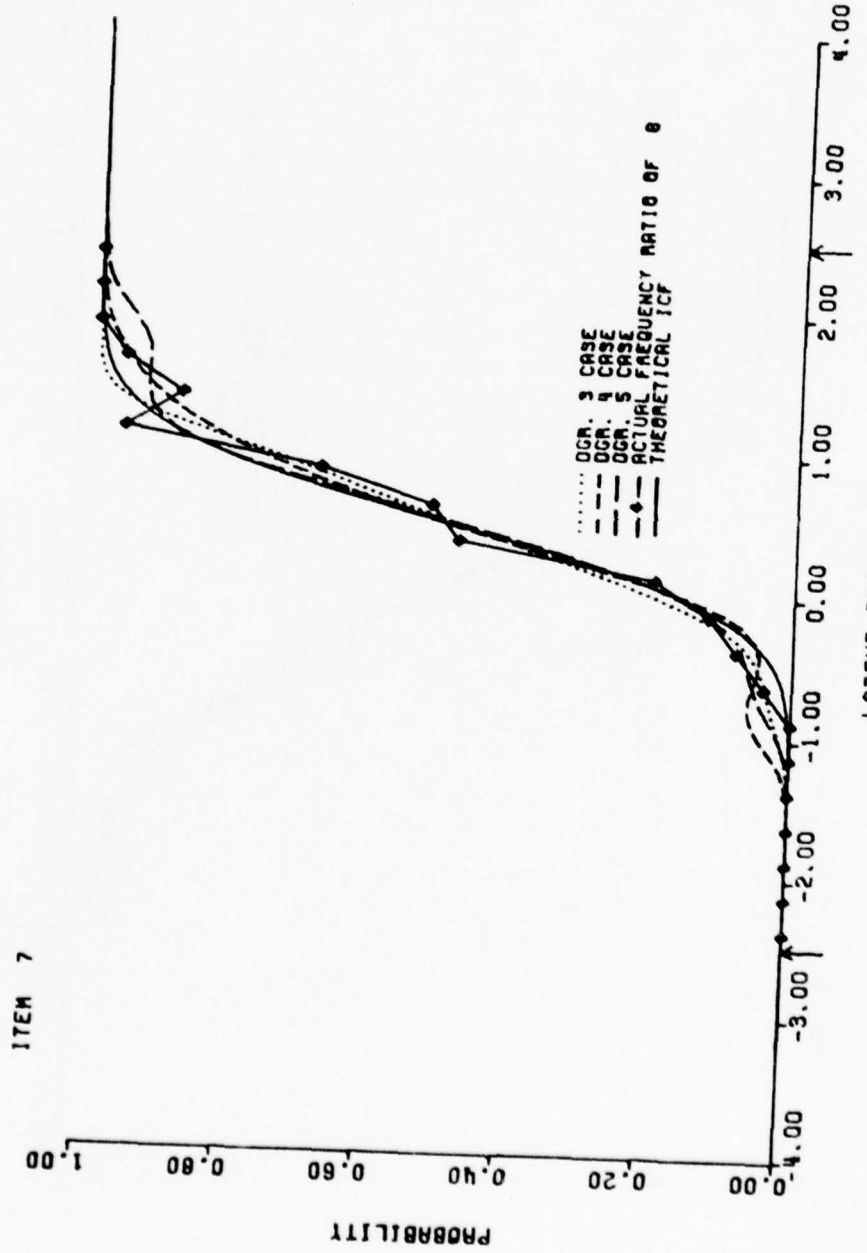

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

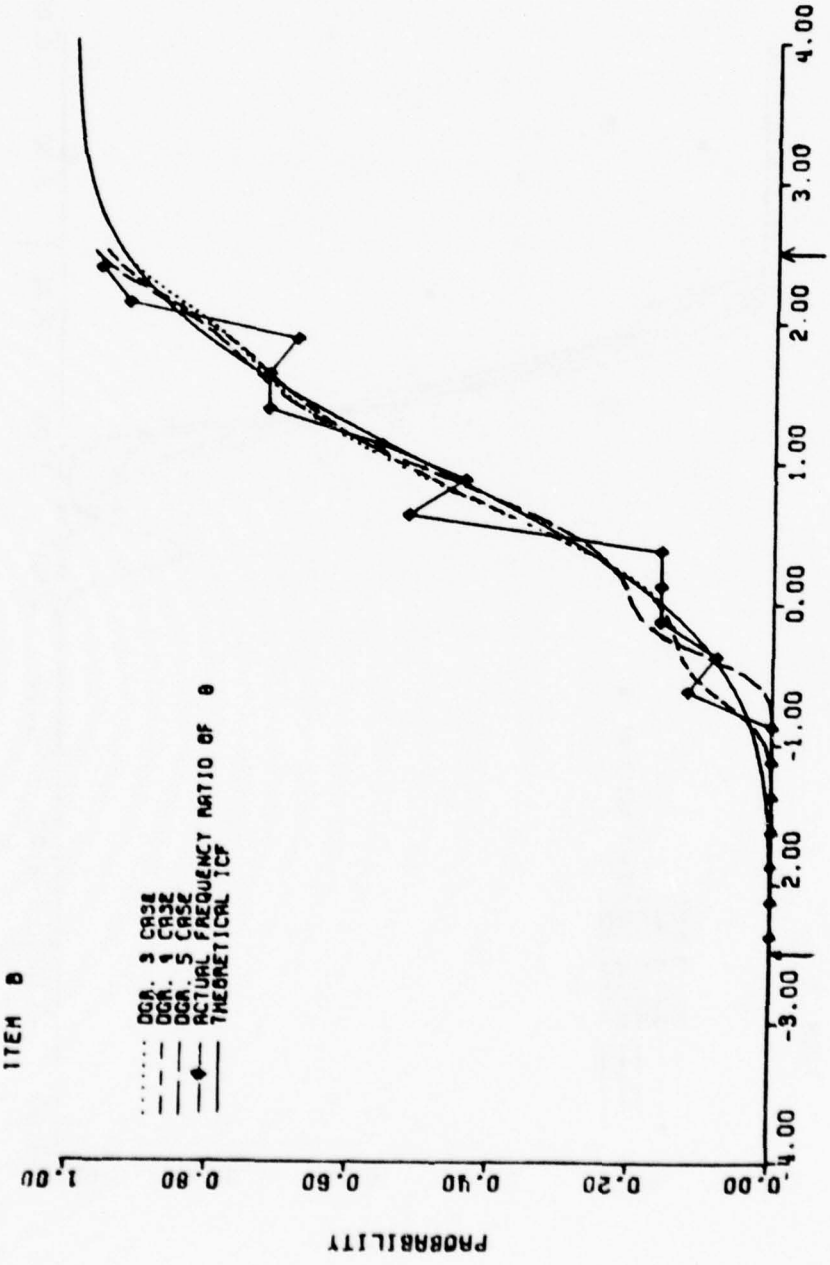

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

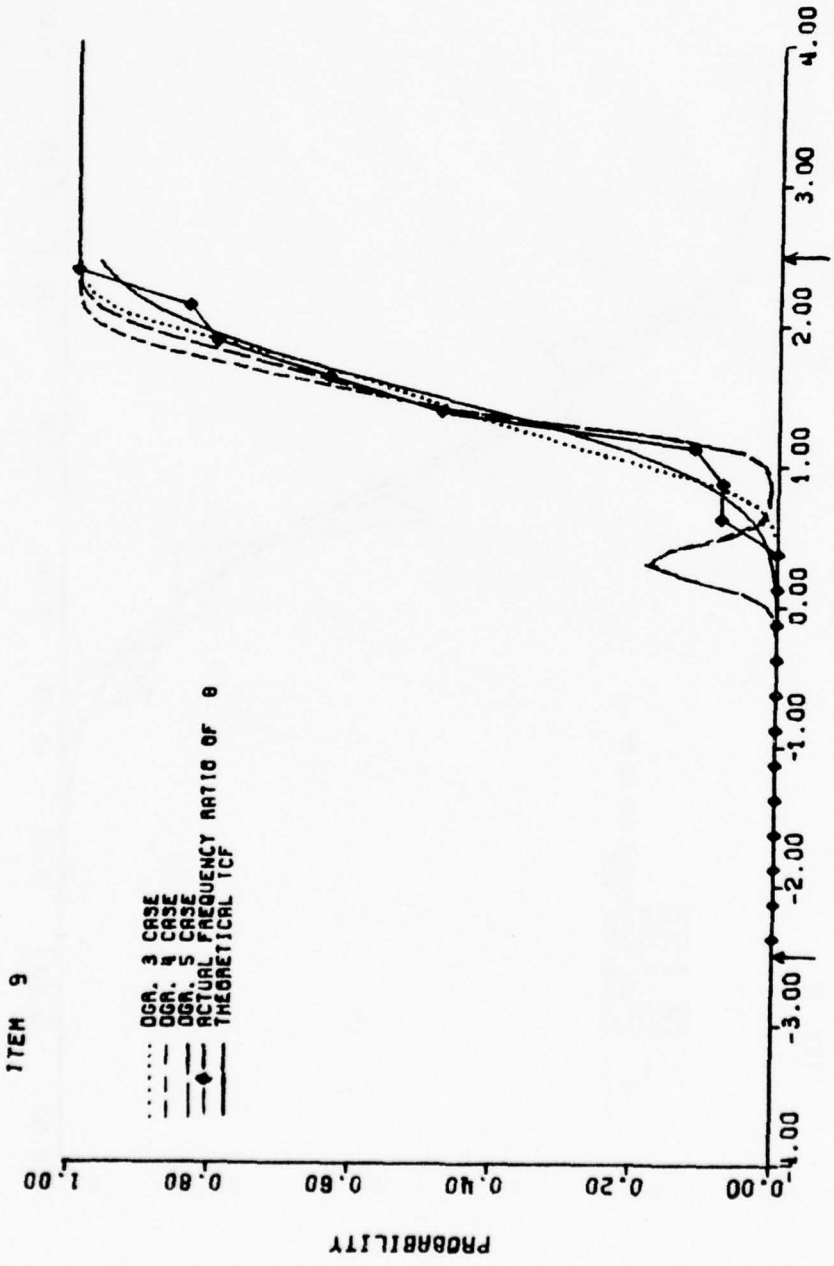

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

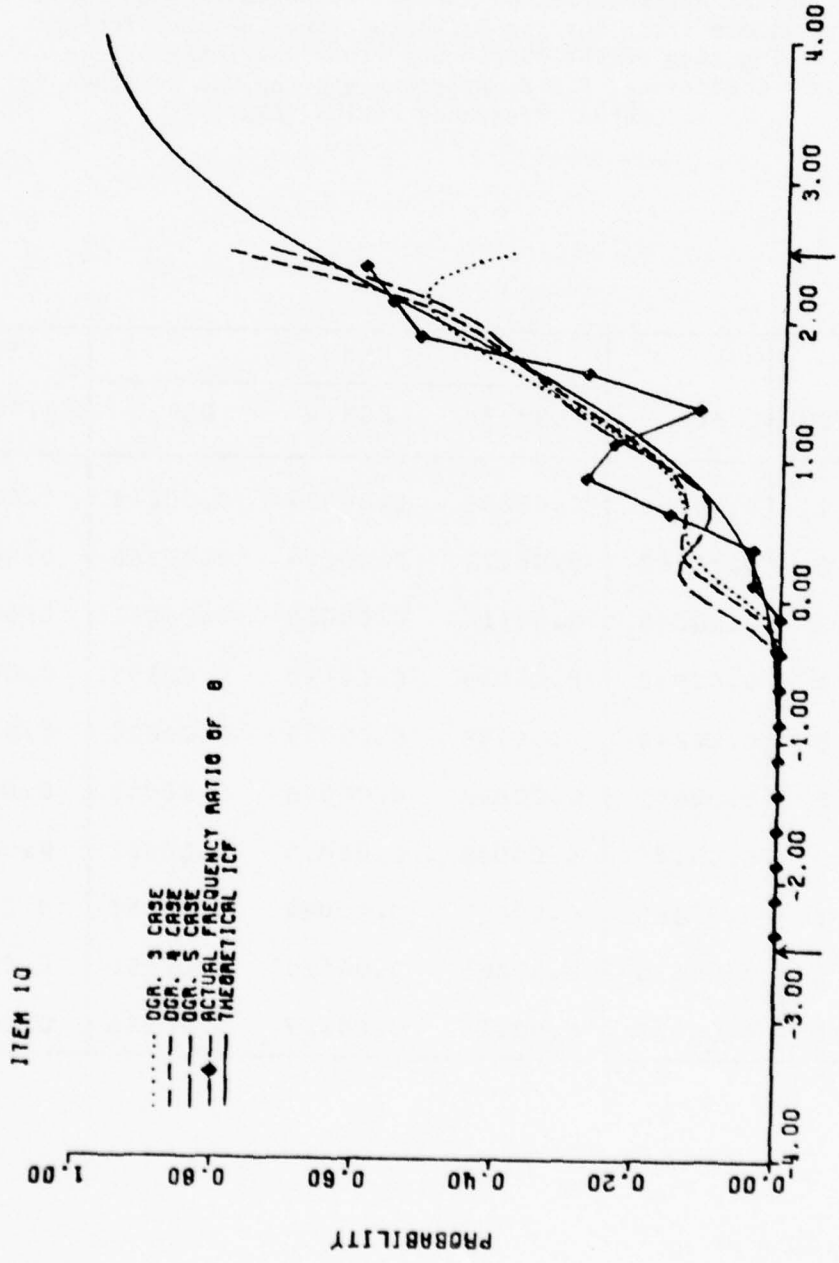

FIGURE 6-1: Estimated Item Characteristic Functions (Continued)

TABLE 6-1

Mean Square Errors of the Estimated Item Characteristic Functions of Ability θ in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method (BNAM), Compared with the Mean Square Error for the Criterion Item Characteristic Function of the Simple Sum Procedure (SSP) of the Conditional P.D.F. Approach and the One for the Actual Frequency Ratios (AFR).

ITEM	AFR	BNAM			SSP
		DGR.3	DGR.4	DGR.5	CRITERION
1	0.00068	0.00235	0.00084	0.00213	0.00070
2	0.00782	0.00223	0.00244	0.00168	0.00121
3	0.00049	0.00119	0.00088	0.00051	0.00098
4	0.00940	0.00039	0.00140	0.00159	0.00269
5	0.00242	0.00029	0.00025	0.00029	0.00059
6	0.00601	0.00238	0.00046	0.00050	0.00089
7	0.00179	0.00066	0.00075	0.00061	0.00120
8	0.00368	0.00053	0.00044	0.00051	0.00109
9	0.00135	0.00065	0.00529	0.00398	0.00051
10	0.00325	0.00275	0.00117	0.00136	0.00124

TABLE 6-2

Square Roots of the Mean Square Errors of the Estimated Item Characteristic Functions of Ability θ in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method (BNAM), Compared with the Mean Square Error for the Criterion Item Characteristic Function of the Simple Sum Procedure (SSP) of the Conditional P.D.F. Approach and the one for the Actual Frequency Ratios (AFR).

ITEM	AFR	BNAM			SSP
		DGR.3	DGR.4	DGR.5	CRITERION
1	0.02610	0.04850	0.02897	0.04610	0.02650
2	0.08843	0.04719	0.04944	0.04093	0.03473
3	0.02223	0.03455	0.02964	0.02260	0.03138
4	0.09696	0.01967	0.03743	0.03989	0.05187
5	0.04923	0.01697	0.01591	0.01695	0.02421
6	0.07754	0.04875	0.02144	0.02242	0.02982
7	0.04236	0.02560	0.02735	0.02462	0.03458
8	0.06070	0.02302	0.02089	0.02252	0.03306
9	0.03671	0.02546	0.07271	0.06310	0.02260
10	0.05701	0.05246	0.03426	0.03684	0.03526

reveals that this tendency is especially true for items of intermediate difficulties, such as items 4, 5, 6, 7 and 8 .

The above results are of particular interest considering that the discrepancy measures for the estimated density functions turned out to be larger than the one obtained for the criterion density function of the Simple Sum Procedure of the Conditional P.D.F. Approach, the fact which was pointed out in the preceding section. No systematic tendencies are observed with respect to the relative superiorities among Degree 3, 4 and 5 Cases.

The two item parameters of the normal ogive model on the dichotomous response level, i.e., the discrimination parameter, a_g , and the difficulty parameter, b_g , are estimated for each item, based on the least squares principle (Samejima, 1977c, 1978a, 1978b, 1978d, 1978e) using the interval of θ , $[-2.0, 2.0]$, with the step of 0.2 and the exclusion of the points at which the estimated item characteristic function exceeds 0.95 or assumes values less than 0.05 . These results are shown in Tables 6-3 and 6-4, respectively, together with the true parameters and the estimated parameters from the criterion item characteristic functions of the Simple Sum Procedure of the Conditional P.D.F. Approach. As has been observed in the other cases, generally speaking, the estimated difficulty parameters are closer to the true parameter values than the estimated discrimination parameters; for large discrimination parameters, the estimation tends to be poor, as we can see in items 3, 7 and 9; and there are no systematic tendencies as to the relative superiorities among Degree 3, 4 and 5 Cases, in both estimations. If we compare these results with those of the criterion item characteristic functions of the Simple Sum Procedure of the Conditional P.D.F. Approach,

TABLE 6-3

Estimated Item Discrimination Parameters, $\hat{a}_g$, in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method (BNAM), Compared with the True Parameters and Those for the Criterion Item Characteristic Functions of the Simple Sum Procedure (SSP) of the Conditional P.D.F. Approach. Estimation Is Based on the Least Squares Principle Using the Interval of θ, [-2.0, 2.0], Excluding the Points for Which $P_g(\theta)$ Is less than 0.05 or Greater than 0.95.

ITEM	TRUE	BNAM			SSP
		DGR.3	DGR.4	DGR.5	CRITERION
1	1.5	---	---	---	1.400_5
2	1.0	1.427	1.424	1.607	1.024
3	2.5	1.974_5	1.602	2.548	1.788
4	1.0	0.915	0.850	0.929	0.868
5	1.5	1.453	1.436	1.468	1.368
6	1.0	1.048	0.922	0.949	0.895
7	2.0	1.711	1.491	1.516	1.473
8	1.0	0.903	0.894	0.950	0.886
9	2.0	2.143	1.227	1.322	1.716
10	1.0	0.723	0.664	0.596	0.725

The points in the interval of θ are taken with equal steps of 0.2. The total number of points used in estimation is shown below each estimate, if it is less than 6. For item 1, there is only one point, so the estimation was not conducted.

TABLE 6-4

Estimated Item Difficulty Parameters, $\hat{b}_g$, in Degree 3, 4 and 5 Cases of the Bivariate Normal Approach Method (BNAM), Compared with the True Parameters and Those for the Criterion Item Characteristic Functions of the Simple Sum Procedure (SSP) of the Conditional P.D.F. Approach. Estimation Is Based on the Least Squares Principle Using the Interval of θ, [-2.0, 2.0], Excluding the Points for Which $P_g(\theta)$ Is Less than 0.05 or Greater than 0.95.

ITEM	TRUE	BNAM			SSP
		DGR.3	DGR.4	DGR.5	CRITERION
1	-2.5	---	---	---	-2.651_5
2	-2.0	-1.810	-1.850	-1.819	-2.002
3	-1.5	-1.565_5	-1.496	-1.525	-1.507
4	-1.0	-1.049	-1.089	-1.083	-1.005
5	-0.5	-0.475	-0.499	-0.475	-0.472
6	0.0	-0.057	-0.074	-0.057	-0.075
7	0.5	0.515	0.510	0.530	0.527
8	1.0	0.960	0.968	0.970	0.981
9	1.5	1.456	1.319	1.294	1.502
10	2.0	2.079	2.210	2.330	2.118

The points in the interval of θ are taken with equal steps of 0.2. The total number of points used in estimation is shown below each estimate, if it is less than 6. For item 1, there is only one point, so the estimation was not conducted.

they are just as good, although there is a slight tendency that the estimation of these parameters is poorer for the items which are very easy or very difficult in the present results.

VII Discussion and Conclusion

Bivariate P.D.F. Approach was introduced, and, combined with Normal Approach Method, was tested on the same simulated data, which have been used in testing various combinations of an approach and a method developed previously. The results turned out to be successful, or just as good as those obtained by the other combinations of an approach and a method. There are no indications that Degree 5 Case provides us with better results than Degree 4 and 3 Cases, nor that Degree 3 Case is inferior to Degree 4 and 5 Cases, in both the estimation of ability distributions and the estimation of item characteristic functions, as far as the present set of simulated data is concerned.

The success in the present paper should be emphasized considering that Normal Approach Method is used, in which only two estimated conditional moments are used and the approximation to the bivariate density function by a normal density function is apparently too crude, especially for extreme values of θ. To ameliorate this, Pearson System Method should naturally be considered. Unlike in Conditional P.D.F. Approach, however, Pearson System Method would cause some problem in the estimation of the parameters with the present simulated data, since not only Pearson's Types I and II distributions and the normal distribution but also those of Types IV, VI and VII are involved, as is clear from Table A-2-1 of Appendix II. Normal Approach Method, on the other hand, is quite simple in application because it requires only two estimated conditional moments, even though it may sacrifice some accuracy of estimation. To avoid the complex nature of Pearson System Method without sacrificing the accuracy of the estimation of the bivariate density function, the adoption of polynomials obtained by the method of moments is being considered, and

some theoretical investigation of the polynomial obtained by the method of moments is under way, which will be published as our Research Report 79-2 in the near future.

The Bivariate P.D.F. Approach proposed in the present paper is somewhat different from the one presented previously (Samejima, 1977b), since the density function of the maximum likelihood estimate $\hat{\theta}$ is approximated by a polynomial obtained by the method of moments, and the result is used in estimating the conditional moments of ability θ, given $\hat{\theta}$. It is suspected that, if the data are different from those used in this sequence of research, and the linear regressions are not so close to the true regressions of θ on $\hat{\theta}$, then the superiority of the present type of Bivariate P.D.F. Approach over Normal Approximation Method may be more conspicuous. Additional research is necessary to investigate this, however, before we reach any conclusion.

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APPENDIX I

A-I Simulated Data

The simulated data used in the present study are characterized as follows.

(1) There are 500 hypothetical examinees.

(2) Their ability, or latent trait, distributes uniformly for the interval of θ, (-2.5, 2.5). Actually, we use 100 discrete points of θ, such as -2.475, -2.425, -2.375, -2.325, ..., 2.375, 2.425 and 2.475, i.e., the midpoints of the 100 subintervals with the width of 0.05, and at each point five examinees are located.

(3) There is a hypothetical test of 35 graded items, each of which has three§ item score categories, and which provides us with an approximately constant test information function, 21.63, for the interval of θ, [-3.0, 3.0], following the normal ogive model of the graded response level (Samejima, 1969, 1972). The test is called the Old Test, to distinguish it from the New Test which will be described later.

(4) Each of the 500 examinees is assumed to have taken the Old Test, and his response pattern on the 35 graded items has been calibrated by the Monte Carlo method. The score categories of each item are 0, 1 and 2, and a typical response pattern looks like: (2,2,2,2,2,1,2,2,2,2,2,2,1,2,2,2,1,2,1,1,1,0,1,1, 1,0,1,0,1,1,0,0,0,0,0).

(5) From each response pattern, the maximum likelihood estimate of the examinee's ability has been obtained, using a computer program written for this purpose. In this process, out of 105 basic

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§ In RR-78-2, RR-78-4, RR-78-5 and RR-79-1, this number is reported to be "four" by mistake, but "three" is the correct number. Related with this, there are some corrections to be made in the first, fifth, and sixth lines from bottom in the same appendix as this one in RR-78-4 and RR-78-5.

functions (Samejima, 1969, 1972), an appropriate set of 35 basic functions are chosen depending upon the item scores in the response pattern, and, using the Newton-Raphson procedure, the point of θ at which the sum total of these 35 basic functions equals zero is searched.

(6) There is another hypothetical test of 10 binary items, each of which follows the normal ogive model of the dichotomous response level. This is called the New Test.

(7) Each of the 500 examinees is assumed to have taken the New Test also, and his response pattern on the New Test has been calibrated by the Monte Carlo method. A typical response pattern looks like: (0,0,0,1,0,0,1,0,1,1).

(8) The item characteristic functions of the test items of the New Test are assumed to be unknown, and they are the target of estimation. Each method of estimation is evaluated by the the "closeness" of the resultant estimated item characteristic functions to the true item characteristic functions,

$$P_g(\theta) = (2\pi)^{-1/2} \int_{-\infty}^{a_g(\theta-b_g)} e^{-\frac{t^2}{2}} dt \quad .$$

APPENDIX II

TABLE A-2-1

The Four Estimated Conditional Moments of the Ability θ, given the Maximum Likelihood Estimate $\hat{\theta}$, the First of Which Is About the Origin and the Other Three of Which Are About the Mean, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ, in Degree 3, 4 and 5 Cases for the Failure and Success Groups of Each of the Ten Binary Items. The Integers in the Column "Type" Indicate the Pearson's Distribution Type Numbers, Except for 8 Which is Used for the Normal Distribution.

DEGREE 3 CASE: Item 1

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
13	-2.8000	-2.68981	0.03195	-0.00251	0.00224	0.193	2.191	-0.072	1
14	-2.7000	-2.61594	0.03591	-0.00130	0.00350	0.037	2.713	-0.041	1
15	-2.6000	-2.53574	0.03803	-0.00072	0.00414	0.009	2.862	-0.023	2
16	-2.5000	-2.45210	0.03918	-0.00037	0.00448	0.002	2.916	-0.010	2
17	-2.4000	-2.36668	0.03971	-0.00013	0.00463	0.000	2.935	-0.001	2
18	-2.3000	-2.28066	0.03975	0.00009	0.00463	0.000	2.934	-0.001	2
19	-2.2000	-2.19508	0.03929	0.00035	0.00449	0.002	2.911	-0.008	2
20	-2.1000	-2.11115	0.03817	0.00072	0.00415	0.009	2.848	-0.021	2
21	-2.0000	-2.03071	0.03597	0.00139	0.00345	0.041	2.668	-0.040	1
22	-1.9000	-1.95704	0.03163	0.00283	0.00199	0.253	1.989	-0.079	1
(Success)									
13	-2.8000	-2.73609	0.04138	-0.00066	0.00500	0.006	2.920	-0.026	1
14	-2.7000	-2.64523	0.04254	-0.00043	0.00535	0.002	2.957	-0.020	2
15	-2.6000	-2.55229	0.04333	-0.00030	0.00558	0.001	2.974	-0.015	2
16	-2.5000	-2.45793	0.04388	-0.00022	0.00575	0.001	2.984	-0.012	8
17	-2.4000	-2.36255	0.04428	-0.00016	0.00586	0.000	2.989	-0.010	8
18	-2.3000	-2.26640	0.04459	-0.00012	0.00595	0.000	2.993	-0.008	8
19	-2.2000	-2.16967	0.04482	-0.00010	0.00602	0.000	2.995	-0.007	8
20	-2.1000	-2.07250	0.04501	-0.00008	0.00607	0.000	2.996	-0.006	8
21	-2.0000	-1.97496	0.04516	-0.00006	0.00611	0.000	2.997	-0.005	8
22	-1.9000	-1.87714	0.04528	-0.00005	0.00615	0.000	2.998	-0.004	8
23	-1.8000	-1.77909	0.04537	-0.00004	0.00617	0.000	2.998	-0.004	8
24	-1.7000	-1.68084	0.04545	-0.00003	0.00620	0.000	2.999	-0.003	8
25	-1.6000	-1.58243	0.04552	-0.00003	0.00621	0.000	2.999	-0.003	8
26	-1.5000	-1.48388	0.04558	-0.00002	0.00623	0.000	2.999	-0.003	8
27	-1.4000	-1.38523	0.04563	-0.00002	0.00624	0.000	2.999	-0.002	8
28	-1.3000	-1.28647	0.04567	-0.00002	0.00626	0.000	2.999	-0.002	8
29	-1.2000	-1.18764	0.04570	-0.00001	0.00627	0.000	2.999	-0.002	8
30	-1.1000	-1.08873	0.04573	-0.00001	0.00627	0.000	3.000	-0.001	8
31	-1.0000	-0.98976	0.04576	-0.00001	0.00628	0.000	3.000	-0.001	8
32	-0.9000	-0.89075	0.04578	-0.00001	0.00629	0.000	3.000	-0.001	8
33	-0.8000	-0.79169	0.04580	-0.00001	0.00629	0.000	3.000	-0.001	8
34	-0.7000	-0.69259	0.04581	-0.00001	0.00630	0.000	3.000	-0.001	8
35	-0.6000	-0.59347	0.04583	-0.00001	0.00630	0.000	3.000	-0.000	8
36	-0.5000	-0.49432	0.04584	-0.00000	0.00630	0.000	3.000	-0.000	8
37	-0.4000	-0.39515	0.04585	-0.00000	0.00630	0.000	3.000	-0.000	8
38	-0.3000	-0.29596	0.04585	-0.00000	0.00631	0.000	3.000	-0.000	8
39	-0.2000	-0.19677	0.04586	-0.00000	0.00631	0.000	3.000	-0.000	8
40	-0.1000	-0.09756	0.04586	-0.00000	0.00631	0.000	3.000	-0.000	8
41	0.0000	0.00164	0.04586	0.00000	0.00631	0.000	3.000	-0.000	8
42	0.1000	0.10085	0.04586	0.00000	0.00631	0.000	3.000	-0.000	8
43	0.2000	0.20004	0.04585	0.00000	0.00631	0.000	3.000	-0.000	8
44	0.3000	0.29923	0.04585	0.00000	0.00631	0.000	3.000	-0.000	8
45	0.4000	0.39841	0.04586	0.00000	0.00630	0.000	3.000	-0.000	8
46	0.5000	0.49756	0.04583	0.00001	0.00630	0.000	3.000	-0.000	8
47	0.6000	0.59669	0.04582	0.00001	0.00630	0.000	3.000	-0.001	8
48	0.7000	0.69580	0.04580	0.00001	0.00629	0.000	3.000	-0.001	8
49	0.8000	0.79486	0.04579	0.00001	0.00629	0.000	3.000	-0.001	8
50	0.9000	0.89389	0.04576	0.00001	0.00628	0.000	3.000	-0.001	8
51	1.0000	0.99287	0.04574	0.00001	0.00628	0.000	3.000	-0.001	8
52	1.1000	1.09179	0.04571	0.00001	0.00627	0.000	2.999	-0.002	8
53	1.2000	1.19064	0.04568	0.00002	0.00626	0.000	2.999	-0.002	8
54	1.3000	1.28941	0.04564	0.00002	0.00625	0.000	2.999	-0.002	8
55	1.4000	1.38809	0.04559	0.00002	0.00623	0.000	2.999	-0.002	8
56	1.5000	1.48666	0.04554	0.00003	0.00622	0.000	2.999	-0.003	8
57	1.6000	1.58510	0.04547	0.00003	0.00620	0.000	2.999	-0.003	8
58	1.7000	1.68339	0.04539	0.00004	0.00618	0.000	2.998	-0.004	8
59	1.8000	1.78149	0.04530	0.00005	0.00615	0.000	2.998	-0.004	8
60	1.9000	1.87936	0.04518	0.00006	0.00612	0.000	2.997	-0.005	8
61	2.0000	1.97696	0.04504	0.00007	0.00608	0.000	2.996	-0.006	8
62	2.1000	2.07422	0.04487	0.00009	0.00603	0.000	2.995	-0.007	8
63	2.2000	2.17104	0.04464	0.00012	0.00596	0.000	2.993	-0.008	8
64	2.3000	2.26732	0.04435	0.00015	0.00588	0.000	2.990	-0.010	8
65	2.4000	2.36288	0.04397	0.00020	0.00577	0.000	2.985	-0.012	8
66	2.5000	2.45747	0.04343	0.00028	0.00562	0.001	2.977	-0.015	8
67	2.6000	2.55073	0.04272	0.00040	0.00541	0.002	2.961	-0.019	2
68	2.7000	2.64207	0.04165	0.00061	0.00508	0.005	2.930	-0.024	2
69	2.8000	2.73051	0.03999	0.00097	0.00457	0.015	2.857	-0.034	1
70	2.9000	2.81429	0.03720	0.00170	0.00367	0.056	2.651	-0.049	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 2

Subject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
17	-2.4000	-2.32570	0.02905	-0.00393	0.00102	0.629	1.207	-0.173	1
18	-2.3000	-2.25561	0.03456	-0.00186	0.00309	0.081	2.524	-0.053	1
19	-2.2000	-2.17849	0.03793	-0.00309	0.00434	0.018	2.811	-0.031	1
20	-2.1000	-2.09251	0.03955	-0.00355	0.00455	0.005	2.905	-0.018	2
21	-2.0000	-2.00587	0.04046	-0.00333	0.00482	0.001	2.944	-0.014	2
22	-1.9000	-1.91777	0.04093	-0.00014	0.00496	0.000	2.962	-0.003	2
23	-1.8000	-1.82901	0.04109	-0.00001	0.00501	0.000	2.969	-0.000	2
24	-1.7000	-1.74017	0.04100	0.00009	0.00499	0.000	2.971	-0.002	2
25	-1.6000	-1.65177	0.04068	0.00020	0.00491	0.001	2.969	-0.007	2
26	-1.5000	-1.56433	0.04012	0.00032	0.00477	0.002	2.962	-0.015	2
27	-1.4000	-1.47840	0.03927	0.00047	0.00455	0.004	2.953	-0.026	1
28	-1.3000	-1.39466	0.03808	0.00064	0.00427	0.007	2.944	-0.041	1
29	-1.2000	-1.31390	0.03652	0.00080	0.00394	0.013	2.955	-0.057	1
30	-1.1000	-1.23682	0.03474	0.00079	0.00373	0.015	3.091	0.083	4
31	-1.0000	-1.16315	0.03368	-0.00008	0.00428	0.000	3.773	0.000	7
32	-0.9000	-1.08782	0.03250	-0.00446	0.00784	0.378	5.650	0.079	4
33	-0.8000	-0.98786	0.06023	-0.01866	0.02010	1.594	5.542	5.538	6
34	-0.7000	-0.79973	0.11759	-0.02817	0.03108	0.488	2.392	-0.163	1
35	-0.6000	-0.50877	0.13330	0.01868	0.03296	0.147	1.855	-0.346	1
36	-0.5000	-0.28729	0.07446	0.02462	0.02541	1.469	4.583	-1.223	1
37	-0.4000	-0.16374	0.04151	0.00735	0.01051	0.755	3.100	0.179	4
38	-0.3000	-0.08429	0.03426	0.00077	0.00493	0.015	4.198	0.005	7
39	-0.2000	-0.01030	0.03467	-0.00074	0.00385	0.013	3.201	0.027	4
(Success)									
14	-2.7000	-2.58360	0.03312	-0.00294	0.00229	0.239	2.084	-0.079	1
15	-2.6000	-2.50663	0.03772	-0.00152	0.00385	0.043	2.707	-0.046	1
16	-2.5000	-2.42201	0.04025	-0.00089	0.00466	0.012	2.875	-0.032	1
17	-2.4000	-2.33315	0.04178	-0.00056	0.00523	0.004	2.937	-0.023	2
18	-2.3000	-2.24162	0.04271	-0.00038	0.00542	0.002	2.964	-0.018	2
19	-2.2000	-2.14829	0.04346	-0.00027	0.00563	0.001	2.978	-0.014	8
20	-2.1000	-2.05371	0.04395	-0.00019	0.00577	0.000	2.986	-0.011	8
21	-2.0000	-1.95821	0.04432	-0.00015	0.00587	0.000	2.991	-0.009	8
22	-1.9000	-1.86202	0.04460	-0.00011	0.00595	0.000	2.993	-0.008	8
23	-1.8000	-1.76530	0.04481	-0.00009	0.00601	0.000	2.995	-0.007	8
24	-1.7000	-1.66816	0.04498	-0.00007	0.00606	0.000	2.996	-0.006	8
25	-1.6000	-1.57070	0.04512	-0.00006	0.00610	0.000	2.997	-0.005	8
26	-1.5000	-1.47296	0.04523	-0.00005	0.00613	0.000	2.998	-0.004	8
27	-1.4000	-1.37501	0.04532	-0.00004	0.00616	0.000	2.998	-0.004	8
28	-1.3000	-1.27687	0.04540	-0.00003	0.00618	0.000	2.999	-0.003	8
29	-1.2000	-1.17859	0.04546	-0.00003	0.00620	0.000	2.999	-0.003	8
30	-1.1000	-1.08017	0.04552	-0.00002	0.00621	0.000	2.999	-0.002	8
31	-1.0000	-0.98165	0.04556	-0.00002	0.00623	0.000	2.999	-0.002	8
32	-0.9000	-0.88304	0.04560	-0.00002	0.00624	0.000	2.999	-0.002	8
33	-0.8000	-0.78435	0.04563	-0.00001	0.00625	0.000	2.999	-0.001	8
34	-0.7000	-0.68559	0.04566	-0.00001	0.00625	0.000	3.000	-0.001	8
35	-0.6000	-0.58679	0.04568	-0.00001	0.00626	0.000	3.000	-0.001	8
36	-0.5000	-0.48794	0.04570	-0.00001	0.00627	0.000	3.000	-0.001	8
37	-0.4000	-0.38905	0.04572	-0.00001	0.00627	0.000	3.000	-0.000	8
38	-0.3000	-0.29013	0.04573	-0.00000	0.00627	0.000	3.000	-0.000	8
39	-0.2000	-0.19119	0.04574	-0.00000	0.00628	0.000	3.000	-0.000	8
40	-0.1000	-0.09223	0.04575	-0.00000	0.00628	0.000	3.000	-0.000	8
41	0.0000	0.00673	0.04575	-0.00000	0.00628	0.000	3.000	-0.000	8
42	0.1000	0.10571	0.04575	0.00000	0.00628	0.000	3.000	-0.000	8
43	0.2000	0.20468	0.04575	0.00000	0.00628	0.000	3.000	-0.000	8
44	0.3000	0.30364	0.04574	0.00000	0.00628	0.000	3.000	-0.000	8
45	0.4000	0.40259	0.04573	0.00000	0.00627	0.000	3.000	-0.000	8
46	0.5000	0.50151	0.04572	0.00001	0.00627	0.000	3.000	-0.000	8
47	0.6000	0.60041	0.04571	0.00001	0.00627	0.000	3.000	-0.001	8
48	0.7000	0.69928	0.04569	0.00001	0.00626	0.000	3.000	-0.001	8
49	0.8000	0.79811	0.04567	0.00001	0.00626	0.000	3.000	-0.001	8
50	0.9000	0.89688	0.04564	0.00001	0.00625	0.000	2.999	-0.001	8
51	1.0000	0.99558	0.04561	0.00002	0.00624	0.000	2.999	-0.002	8
52	1.1000	1.09422	0.04557	0.00002	0.00623	0.000	2.999	-0.002	8
53	1.2000	1.19278	0.04553	0.00002	0.00622	0.000	2.999	-0.002	8
54	1.3000	1.29119	0.04547	0.00003	0.00620	0.000	2.999	-0.003	8
55	1.4000	1.38949	0.04541	0.00003	0.00618	0.000	2.998	-0.003	8
56	1.5000	1.48764	0.04533	0.00004	0.00616	0.000	2.998	-0.004	8
57	1.6000	1.58559	0.04523	0.00005	0.00613	0.000	2.998	-0.004	8
58	1.7000	1.68332	0.04511	0.00006	0.00610	0.000	2.997	-0.005	8
59	1.8000	1.78076	0.04497	0.00008	0.00606	0.000	2.996	-0.006	8
60	1.9000	1.87786	0.04478	0.00010	0.00601	0.000	2.995	-0.008	8
61	2.0000	1.97468	0.04455	0.00012	0.00594	0.000	2.993	-0.009	8
62	2.1000	2.07056	0.04424	0.00016	0.00585	0.000	2.991	-0.011	8
63	2.2000	2.16584	0.04384	0.00022	0.00573	0.001	2.988	-0.014	8
64	2.3000	2.26011	0.04328	0.00030	0.00557	0.001	2.984	-0.018	8
65	2.4000	2.35279	0.04250	0.00044	0.00536	0.002	2.978	-0.025	8
66	2.5000	2.44371	0.04133	0.00066	0.00497	0.004	2.969	-0.036	8
67	2.6000	2.53129	0.03949	0.00104	0.00441	0.013	2.960	-0.060	8
68	2.7000	2.61363	0.03633	0.00194	0.00338	0.028	2.961	-0.099	8
69	2.8000	2.68464	0.03028	0.00450	0.00171	0.078	2.987	-0.180	8

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TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 3

Subject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
16	-2.5000	-2.43672	0.03380	-0.00240	0.00264	0.149	2.310	-0.066	1
17	-2.4000	-2.35905	0.03759	-0.00126	0.00389	0.030	2.755	-0.039	1
18	-2.3000	-2.27528	0.03967	-0.00072	0.00454	0.008	2.888	-0.025	1
19	-2.2000	-2.18804	0.04088	-0.00043	0.00491	0.003	2.939	-0.016	2
20	-2.1000	-2.09875	0.04160	-0.00025	0.00513	0.001	2.962	-0.009	2
21	-2.0000	-2.00825	0.04202	-0.00013	0.00525	0.000	2.973	-0.003	2
22	-1.9000	-1.91712	0.04220	-0.00004	0.00530	0.000	2.978	-0.000	8
23	-1.8000	-1.82578	0.04221	-0.00004	0.00531	0.000	2.979	-0.000	8
24	-1.7000	-1.73462	0.04204	0.00012	0.00526	0.000	2.977	-0.003	8
25	-1.6000	-1.64404	0.04167	0.00022	0.00516	0.001	2.970	-0.008	2
26	-1.5000	-1.55449	0.04107	0.00035	0.00499	0.002	2.957	-0.014	2
27	-1.4000	-1.46661	0.04011	0.00055	0.00471	0.005	2.928	-0.022	2
28	-1.3000	-1.38136	0.03859	0.00088	0.00426	0.014	2.864	-0.033	1
29	-1.2000	-1.30035	0.03608	0.00151	0.00350	0.048	2.691	-0.048	1
30	-1.1000	-1.22265	0.03157	0.00285	0.00205	0.258	2.062	-0.083	1
(Success)									
20	-2.1000	-1.97339	0.02927	-0.00437	0.00087	0.763	1.012	-0.278	1
21	-2.0000	-1.90209	0.03584	-0.00208	0.00322	0.094	2.507	-0.058	1
22	-1.9000	-1.82055	0.03920	-0.00115	0.00432	0.022	2.814	-0.038	1
23	-1.8000	-1.73347	0.04114	-0.00070	0.00493	0.007	2.913	-0.027	1
24	-1.7000	-1.64705	0.04237	-0.00046	0.00530	0.003	2.953	-0.020	2
25	-1.6000	-1.55945	0.04319	-0.00031	0.00554	0.001	2.973	-0.016	2
26	-1.5000	-1.45637	0.04376	-0.00022	0.00571	0.001	2.983	-0.012	8
27	-1.4000	-1.36123	0.04418	-0.00017	0.00583	0.000	2.989	-0.010	8
28	-1.3000	-1.26530	0.04449	-0.00013	0.00592	0.000	2.992	-0.008	8
29	-1.2000	-1.16878	0.04473	-0.00010	0.00599	0.000	2.994	-0.007	8
30	-1.1000	-1.07181	0.04492	-0.00008	0.00604	0.000	2.996	-0.006	8
31	-1.0000	-0.97446	0.04507	-0.00006	0.00609	0.000	2.997	-0.005	8
32	-0.9000	-0.87684	0.04519	-0.00005	0.00612	0.000	2.998	-0.004	8
33	-0.8000	-0.77897	0.04528	-0.00004	0.00615	0.000	2.998	-0.004	8
34	-0.7000	-0.68092	0.04536	-0.00003	0.00617	0.000	2.999	-0.003	8
35	-0.6000	-0.58271	0.04543	-0.00003	0.00619	0.000	2.999	-0.002	8
36	-0.5000	-0.48438	0.04548	-0.00002	0.00620	0.000	2.999	-0.002	8
37	-0.4000	-0.38593	0.04553	-0.00002	0.00622	0.000	2.999	-0.002	8
38	-0.3000	-0.28741	0.04556	-0.00002	0.00623	0.000	2.999	-0.001	8
39	-0.2000	-0.18881	0.04559	-0.00001	0.00623	0.000	2.999	-0.001	8
40	-0.1000	-0.09015	0.04561	-0.00001	0.00624	0.000	2.999	-0.001	8
41	0.0000	0.00855	0.04563	-0.00001	0.00625	0.000	2.999	-0.000	8
42	0.1000	0.10728	0.04565	-0.00000	0.00625	0.000	3.000	-0.000	8
43	0.2000	0.20634	0.04565	-0.00000	0.00625	0.000	3.000	-0.000	8
44	0.3000	0.30480	0.04566	-0.00000	0.00625	0.000	3.000	-0.000	8
45	0.4000	0.40358	0.04566	0.00000	0.00625	0.000	3.000	-0.000	8
46	0.5000	0.50235	0.04565	0.00000	0.00625	0.000	3.000	-0.000	8
47	0.6000	0.60110	0.04564	0.00001	0.00625	0.000	3.000	-0.000	8
48	0.7000	0.69983	0.04563	0.00001	0.00625	0.000	2.999	-0.000	8
49	0.8000	0.79852	0.04561	0.00001	0.00624	0.000	2.999	-0.001	8
50	0.9000	0.89717	0.04559	0.00001	0.00623	0.000	2.999	-0.001	8
51	1.0000	0.99577	0.04556	0.00002	0.00623	0.000	2.999	-0.001	8
52	1.1000	1.09428	0.04552	0.00002	0.00621	0.000	2.999	-0.002	8
53	1.2000	1.19271	0.04548	0.00002	0.00620	0.000	2.999	-0.002	8
54	1.3000	1.29103	0.04542	0.00003	0.00619	0.000	2.999	-0.003	8
55	1.4000	1.38922	0.04535	0.00003	0.00617	0.000	2.998	-0.003	8
56	1.5000	1.48724	0.04527	0.00004	0.00614	0.000	2.998	-0.004	8
57	1.6000	1.58506	0.04517	0.00005	0.00611	0.000	2.997	-0.004	8
58	1.7000	1.68264	0.04504	0.00006	0.00608	0.000	2.997	-0.005	8
59	1.8000	1.77992	0.04488	0.00008	0.00603	0.000	2.996	-0.006	8
60	1.9000	1.87681	0.04468	0.00010	0.00598	0.000	2.994	-0.007	8
61	2.0000	1.97321	0.04443	0.00013	0.00590	0.000	2.991	-0.009	8
62	2.1000	2.06898	0.04409	0.00018	0.00581	0.000	2.987	-0.011	8
63	2.2000	2.16390	0.04364	0.00024	0.00568	0.001	2.981	-0.013	8
64	2.3000	2.25766	0.04301	0.00034	0.00549	0.001	2.969	-0.017	2
65	2.4000	2.34980	0.04211	0.00051	0.00522	0.003	2.945	-0.022	2
66	2.5000	2.43951	0.04073	0.00079	0.00480	0.009	2.895	-0.029	1
67	2.6000	2.52543	0.03851	0.00133	0.00410	0.031	2.765	-0.042	1
68	2.7000	2.60490	0.03455	0.00249	0.00278	0.151	2.326	-0.067	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 4

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Success)									
14	-2.7000	-2.58660	0.05060	0.00341	0.00867	0.090	3.385	0.117	4
15	-2.6000	-2.48361	0.04532	0.00182	0.00680	0.028	3.312	0.039	4
16	-2.5000	-2.38469	0.04305	0.00060	0.00588	0.005	3.173	0.010	7
17	-2.4000	-2.29036	0.04234	0.00011	0.00552	0.000	3.079	0.001	7
18	-2.3000	-2.20089	0.04232	-0.00008	0.00541	0.000	3.031	0.001	7
19	-2.2000	-2.11510	0.04258	-0.00015	0.00546	0.000	3.009	0.002	8
20	-2.1000	-2.02064	0.04292	-0.00016	0.00551	0.000	3.000	-0.036	1
21	-2.0000	-1.92741	0.04327	-0.00016	0.00561	0.000	2.997	-0.031	1
22	-1.9000	-1.83344	0.04360	-0.00014	0.00569	0.000	2.996	-0.029	8
23	-1.8000	-1.73882	0.04388	-0.00012	0.00577	0.000	2.996	-0.015	8
24	-1.7000	-1.64361	0.04413	-0.00011	0.00584	0.000	2.996	-0.012	8
25	-1.6000	-1.54791	0.04435	-0.00009	0.00589	0.000	2.997	-0.011	8
26	-1.5000	-1.45177	0.04453	-0.00008	0.00594	0.000	2.997	-0.009	8
27	-1.4000	-1.35527	0.04469	-0.00007	0.00599	0.000	2.998	-0.008	8
28	-1.3000	-1.25844	0.04482	-0.00006	0.00602	0.000	2.998	-0.007	8
29	-1.2000	-1.16135	0.04494	-0.00005	0.00606	0.000	2.998	-0.006	8
30	-1.1000	-1.06402	0.04504	-0.00004	0.00608	0.000	2.999	-0.005	8
31	-1.0000	-0.96649	0.04513	-0.00004	0.00611	0.000	2.999	-0.005	8
32	-0.9000	-0.86878	0.04520	-0.00003	0.00613	0.000	2.999	-0.004	8
33	-0.8000	-0.77092	0.04527	-0.00003	0.00615	0.000	2.999	-0.003	8
34	-0.7000	-0.67293	0.04532	-0.00002	0.00616	0.000	2.999	-0.003	8
35	-0.6000	-0.57482	0.04537	-0.00002	0.00617	0.000	2.999	-0.002	8
36	-0.5000	-0.47662	0.04542	-0.00002	0.00619	0.000	2.999	-0.002	8
37	-0.4000	-0.37833	0.04545	-0.00002	0.00620	0.000	2.999	-0.002	8
38	-0.3000	-0.27997	0.04548	-0.00001	0.00620	0.000	2.999	-0.001	8
39	-0.2000	-0.18155	0.04551	-0.00001	0.00621	0.000	3.000	-0.001	8
40	-0.1000	-0.08308	0.04553	-0.00001	0.00622	0.000	3.000	-0.001	8
41	0.0000	0.01543	0.04554	-0.00001	0.00622	0.000	3.000	-0.000	8
42	0.1000	0.11398	0.04556	-0.00000	0.00623	0.000	3.000	-0.000	8
43	0.2000	0.21254	0.04557	-0.00000	0.00623	0.000	3.000	-0.000	8
44	0.3000	0.31112	0.04557	-0.00000	0.00623	0.000	3.000	-0.000	8
45	0.4000	0.40971	0.04557	0.00000	0.00623	0.000	3.000	-0.000	8
46	0.5000	0.50829	0.04557	0.00000	0.00623	0.000	3.000	-0.000	8
47	0.6000	0.60685	0.04556	0.00000	0.00623	0.000	3.000	-0.000	8
48	0.7000	0.70540	0.04555	0.00001	0.00622	0.000	2.999	-0.000	8
49	0.8000	0.80391	0.04553	0.00001	0.00622	0.000	2.999	-0.001	8
50	0.9000	0.90238	0.04550	0.00001	0.00621	0.000	2.999	-0.001	8
51	1.0000	1.00078	0.04547	0.00002	0.00620	0.000	2.999	-0.001	8
52	1.1000	1.09911	0.04543	0.00002	0.00619	0.000	2.999	-0.002	8
53	1.2000	1.19735	0.04539	0.00002	0.00618	0.000	2.999	-0.002	8
54	1.3000	1.29548	0.04533	0.00003	0.00616	0.000	2.999	-0.003	8
55	1.4000	1.39346	0.04526	0.00004	0.00614	0.000	2.998	-0.003	8
56	1.5000	1.49127	0.04517	0.00005	0.00612	0.000	2.998	-0.004	8
57	1.6000	1.58886	0.04506	0.00006	0.00608	0.000	2.997	-0.005	8
58	1.7000	1.68620	0.04492	0.00007	0.00605	0.000	2.996	-0.005	8
59	1.8000	1.78319	0.04475	0.00009	0.00600	0.000	2.995	-0.006	8
60	1.9000	1.87977	0.04453	0.00012	0.00593	0.000	2.993	-0.008	8
61	2.0000	1.97580	0.04424	0.00015	0.00585	0.000	2.990	-0.009	8
62	2.1000	2.07112	0.04386	0.00020	0.00574	0.000	2.985	-0.012	8
63	2.2000	2.16547	0.04334	0.00028	0.00559	0.001	2.976	-0.015	8
64	2.3000	2.25868	0.04261	0.00041	0.00537	0.002	2.960	-0.019	2
65	2.4000	2.34956	0.04152	0.00061	0.00505	0.005	2.928	-0.025	2
66	2.5000	2.43717	0.03984	0.00099	0.00451	0.015	2.852	-0.034	1
67	2.6000	2.52113	0.03700	0.00173	0.00361	0.059	2.638	-0.050	1
68	2.7000	2.59608	0.03167	0.00346	0.00176	0.377	1.796	-0.100	1
(Failure)									
15	-2.6000	-2.51169	0.03167	-0.00341	0.00175	0.372	1.782	-0.099	1
16	-2.5000	-2.43667	0.03672	-0.00170	0.00356	0.058	2.651	-0.050	1
17	-2.4000	-2.35794	0.03950	-0.00096	0.00445	0.015	2.851	-0.033	1
18	-2.3000	-2.26858	0.04114	-0.00059	0.00495	0.005	2.927	-0.021	2
19	-2.2000	-2.17637	0.04218	-0.00039	0.00527	0.002	2.959	-0.017	2
20	-2.1000	-2.08432	0.04287	-0.00028	0.00547	0.001	2.975	-0.013	8
21	-2.0000	-1.99102	0.04335	-0.00018	0.00561	0.000	2.984	-0.009	8
22	-1.9000	-1.89646	0.04368	-0.00013	0.00571	0.000	2.989	-0.007	8
23	-1.8000	-1.80210	0.04392	-0.00009	0.00577	0.000	2.992	-0.006	8
24	-1.7000	-1.70690	0.04408	-0.00006	0.00582	0.000	2.994	-0.003	8
25	-1.6000	-1.61142	0.04419	-0.00004	0.00585	0.000	2.995	-0.001	8
26	-1.5000	-1.51575	0.04425	-0.00002	0.00587	0.000	2.996	-0.001	8
27	-1.4000	-1.41998	0.04428	-0.00001	0.00588	0.000	2.997	-0.000	8
28	-1.3000	-1.32417	0.04428	0.00001	0.00588	0.000	2.997	-0.000	8
29	-1.2000	-1.22830	0.04428	0.00002	0.00587	0.000	2.998	-0.001	8
30	-1.1000	-1.13240	0.04427	0.00003	0.00586	0.000	2.998	-0.001	8
31	-1.0000	-1.03711	0.04425	0.00003	0.00585	0.000	2.999	-0.001	8
32	-0.9000	-0.94168	0.04422	0.00004	0.00583	0.000	3.000	-0.002	8
33	-0.8000	-0.84641	0.04420	0.00003	0.00581	0.000	3.002	0.000	8
34	-0.7000	-0.75129	0.04394	0.00002	0.00583	0.000	3.005	0.000	8
35	-0.6000	-0.65626	0.04392	-0.00001	0.00581	0.000	3.010	0.000	8
36	-0.5000	-0.56118	0.04401	-0.00001	0.00585	0.001	3.015	0.001	8
37	-0.4000	-0.46574	0.04427	-0.00003	0.00595	0.000	3.015	0.004	7
38	-0.3000	-0.36938	0.04487	-0.00009	0.00618	0.002	3.038	0.011	7
39	-0.2000	-0.27117	0.04611	-0.00021	0.00654	0.009	3.086	0.029	7
40	-0.1000	-0.16561	0.04801	-0.00037	0.00716	0.012	3.104	0.034	4
41	0.0000	-0.06256	0.05112	-0.00069	0.00838	0.021	3.184	0.054	4
42	0.1000	0.05210	0.05517	-0.00104	0.00914	0.023	3.001	-0.278	1
43	0.2000	0.17611	0.05917	-0.00158	0.01011	0.012	2.881	-0.034	1
44	0.3000	0.31899	0.06136	-0.00031	0.01059	0.000	2.814	-0.001	2
45	0.4000	0.43932	0.06045	0.00112	0.01040	0.006	2.843	-0.013	2
46	0.5000	0.54668	0.05711	0.00193	0.00960	0.023	2.954	-0.048	1
47	0.6000	0.64546	0.05283	0.00185	0.00851	0.023	3.051	0.394	4
48	0.7000	0.74574	0.04930	0.00134	0.00756	0.018	3.101	0.377	4
49	0.8000	0.84957	0.04688	0.00087	0.00680	0.007	3.095	0.233	4

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 5

Subject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.49031	0.02691	-0.00520	0.00002	1.390	0.026	0.077	4
16	-2.5000	-2.42273	0.03458	-0.00237	0.00283	0.136	2.365	-0.065	1
17	-2.4000	-2.36341	0.03836	-0.00127	0.00408	0.029	2.774	-0.040	1
18	-2.3000	-2.25793	0.04049	-0.00076	0.00475	0.009	2.897	-0.028	1
19	-2.2000	-2.16881	0.04180	-0.00048	0.00515	0.003	2.946	-0.020	2
20	-2.1000	-2.07740	0.04266	-0.00032	0.00540	0.001	2.969	-0.015	2
21	-2.0000	-1.98445	0.04324	-0.00022	0.00557	0.001	2.981	-0.011	8
22	-1.9000	-1.89044	0.04365	-0.00016	0.00569	0.000	2.987	-0.009	8
23	-1.8000	-1.79568	0.04396	-0.00011	0.00578	0.000	2.991	-0.006	8
24	-1.7000	-1.70037	0.04415	-0.00008	0.00584	0.000	2.993	-0.004	8
25	-1.6000	-1.60468	0.04431	-0.00006	0.00588	0.000	2.995	-0.003	8
26	-1.5000	-1.50871	0.04441	-0.00004	0.00591	0.000	2.996	-0.002	8
27	-1.4000	-1.41255	0.04448	-0.00002	0.00593	0.000	2.997	-0.001	8
28	-1.3000	-1.31628	0.04452	-0.00001	0.00594	0.000	2.997	-0.000	8
29	-1.2000	-1.21994	0.04454	-0.00000	0.00595	0.000	2.998	-0.000	8
30	-1.1000	-1.12360	0.04453	0.00001	0.00594	0.000	2.998	-0.000	8
31	-1.0000	-1.02730	0.04450	0.00002	0.00594	0.000	2.998	-0.001	8
32	-0.9000	-0.93106	0.04446	0.00002	0.00593	0.000	2.999	-0.001	8
33	-0.8000	-0.83493	0.04441	0.00003	0.00591	0.000	2.999	-0.003	8
34	-0.7000	-0.73892	0.04435	0.00003	0.00590	0.000	3.000	-0.005	8
35	-0.6000	-0.64305	0.04428	0.00004	0.00588	0.000	3.001	-0.004	8
36	-0.5000	-0.54732	0.04423	0.00002	0.00587	0.000	3.003	0.001	8
37	-0.4000	-0.45167	0.04420	0.00000	0.00587	0.000	3.007	0.000	8
38	-0.3000	-0.35604	0.04424	-0.00004	0.00590	0.000	3.012	-0.001	8
39	-0.2000	-0.26019	0.04439	-0.00011	0.00595	0.000	3.022	0.002	8
40	-0.1000	-0.16382	0.04475	-0.00023	0.00608	0.001	3.036	0.006	7
41	0.0000	-0.06633	0.04545	-0.00043	0.00631	0.002	3.055	0.014	7
42	0.1000	0.03321	0.04668	-0.00073	0.00670	0.005	3.074	0.030	6
43	0.2000	0.13620	0.04867	-0.00112	0.00710	0.011	3.081	0.063	6
44	0.3000	0.24443	0.05152	-0.00150	0.00810	0.016	3.053	0.216	6
45	0.4000	0.35957	0.05497	-0.00162	0.00901	0.016	2.982	-0.141	1
46	0.5000	0.48207	0.05812	-0.00117	0.00977	0.007	2.892	-0.022	2
(Success)									
26	-1.5000	-1.33706	0.03014	-0.00303	0.00186	0.328	2.016	-0.099	1
27	-1.4000	-1.24619	0.01525	-0.00169	0.00312	0.065	2.670	-0.056	1
28	-1.3000	-1.18174	0.03814	-0.00105	0.00415	0.020	2.853	-0.042	1
29	-1.2000	-1.10207	0.03800	-0.00070	0.00468	0.008	2.923	-0.032	1
30	-1.1000	-1.01410	0.04126	-0.00049	0.00503	0.003	2.955	-0.026	1
31	-1.0000	-0.92382	0.04216	-0.00035	0.00528	0.002	2.972	-0.021	2
32	-0.9000	-0.83147	0.04282	-0.00027	0.00547	0.001	2.982	-0.017	8
33	-0.8000	-0.73866	0.04332	-0.00020	0.00561	0.001	2.987	-0.014	8
34	-0.7000	-0.64450	0.04371	-0.00016	0.00572	0.000	2.991	-0.012	8
35	-0.6000	-0.54959	0.04402	-0.00013	0.00580	0.000	2.993	-0.010	8
36	-0.5000	-0.45408	0.04427	-0.00010	0.00587	0.000	2.995	-0.009	8
37	-0.4000	-0.35808	0.04447	-0.00008	0.00592	0.000	2.996	-0.007	8
38	-0.3300	-0.26170	0.04463	-0.00007	0.00597	0.000	2.997	-0.006	8
39	-0.2000	-0.16500	0.04477	-0.00006	0.00601	0.000	2.997	-0.005	8
40	-0.1000	-0.06803	0.04488	-0.00005	0.00604	0.000	2.998	-0.004	8
41	0.0000	0.02915	0.04497	-0.00004	0.00606	0.000	2.998	-0.003	8
42	0.1000	0.12651	0.04504	-0.00003	0.00608	0.000	2.999	-0.003	8
43	0.2000	0.22401	0.04510	-0.00002	0.00610	0.000	2.999	-0.002	8
44	0.3000	0.32164	0.04515	-0.00002	0.00611	0.000	2.999	-0.001	8
45	0.4000	0.41935	0.04519	-0.00001	0.00612	0.000	2.999	-0.001	8
46	0.5000	0.51714	0.04521	-0.00001	0.00613	0.000	2.999	-0.000	8
47	0.6000	0.61497	0.04523	-0.00001	0.00614	0.000	2.999	-0.000	8
48	0.7000	0.71283	0.04524	-0.00000	0.00614	0.000	2.999	-0.000	8
49	0.8000	0.81069	0.04524	0.00000	0.00614	0.000	2.999	-0.000	8
50	0.9000	0.90854	0.04522	0.00001	0.00613	0.000	2.999	-0.000	8
51	1.0000	1.00635	0.04520	0.00001	0.00613	0.000	2.999	-0.001	8
52	1.1000	1.10410	0.04517	0.00002	0.00612	0.000	2.999	-0.001	8
53	1.2000	1.20176	0.04512	0.00003	0.00610	0.000	2.998	-0.002	8
54	1.3000	1.29930	0.04505	0.00004	0.00608	0.000	2.998	-0.003	8
55	1.4000	1.39667	0.04497	0.00004	0.00606	0.000	2.997	-0.003	8
56	1.5000	1.49386	0.04488	0.00006	0.00603	0.000	2.997	-0.004	8
57	1.6000	1.59074	0.04472	0.00007	0.00599	0.000	2.996	-0.005	8
58	1.7000	1.68728	0.04453	0.00010	0.00594	0.000	2.994	-0.006	6
59	1.8000	1.78330	0.04429	0.00011	0.00587	0.000	2.992	-0.008	8
60	1.9000	1.87887	0.04398	0.00013	0.00578	0.000	2.988	-0.010	8
61	2.0000	1.97357	0.04355	0.00023	0.00565	0.001	2.981	-0.012	8
62	2.1000	2.06717	0.04295	0.00033	0.00548	0.001	2.970	-0.016	2
63	2.2000	2.15921	0.04209	0.00048	0.00522	0.001	2.954	-0.021	2
64	2.3000	2.24895	0.04078	0.00075	0.00481	0.006	2.902	-0.028	1
65	2.4000	2.33510	0.03868	0.00125	0.00417	0.027	2.785	-0.040	1
66	2.5000	2.41519	0.03498	0.00231	0.00296	0.125	2.601	-0.063	1
67	2.6000	2.48185	0.02756	0.00502	0.00021	1.208	0.297	0.149	4

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 6

Sub-ject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.511171	0.03404	-0.00281	0.00262	0.171	2.259	-0.070	1
16	-2.5000	-2.413712	0.03617	-0.00138	0.00400	0.034	2.748	-0.043	1
17	-2.4000	-2.316781	0.04047	-0.00081	0.00473	0.010	2.889	-0.030	1
18	-2.3000	-2.219865	0.04188	-0.00052	0.00516	0.004	2.965	-0.022	2
19	-2.2000	-2.122899	0.04283	-0.00035	0.00544	0.002	2.987	-0.017	2
20	-2.1000	-2.025367	0.04343	-0.00024	0.00562	0.001	2.980	-0.013	2
21	-2.0000	-1.927920	0.04388	-0.00018	0.00575	0.000	2.987	-0.010	2
22	-1.9000	-1.830389	0.04422	-0.00013	0.00585	0.000	2.991	-0.008	2
23	-1.8000	-1.732795	0.04446	-0.00010	0.00592	0.000	2.994	-0.006	2
24	-1.7000	-1.635155	0.04465	-0.00008	0.00597	0.000	2.995	-0.005	2
25	-1.6000	-1.537479	0.04480	-0.00006	0.00601	0.000	2.996	-0.004	2
26	-1.5000	-1.439776	0.04491	-0.00004	0.00604	0.000	2.997	-0.003	2
27	-1.4000	-1.342051	0.04499	-0.00003	0.00607	0.000	2.998	-0.002	2
28	-1.3000	-1.244310	0.04504	-0.00003	0.00609	0.000	2.998	-0.001	2
29	-1.2000	-1.146557	0.04510	-0.00002	0.00610	0.000	2.998	-0.001	2
30	-1.1000	-1.048797	0.04513	-0.00001	0.00611	0.000	2.999	-0.000	2
31	-1.0000	-0.951030	0.04515	-0.00001	0.00611	0.000	2.999	-0.000	2
32	-0.9000	-0.853261	0.04516	-0.00001	0.00612	0.000	2.999	-0.000	2
33	-0.8000	-0.755492	0.04515	0.00000	0.00611	0.000	2.999	-0.000	2
34	-0.7000	-0.657726	0.04515	0.00001	0.00611	0.000	2.999	-0.000	2
35	-0.6000	-0.559963	0.04511	0.00002	0.00610	0.000	2.999	-0.001	2
36	-0.5000	-0.462208	0.04507	0.00002	0.00609	0.000	2.999	-0.001	2
37	-0.4000	-0.364463	0.04502	0.00003	0.00608	0.000	2.999	-0.002	2
38	-0.3000	-0.266733	0.04496	0.00003	0.00606	0.000	2.998	-0.003	2
39	-0.2000	-0.169013	0.04487	0.00004	0.00604	0.000	2.998	-0.004	2
40	-0.1000	-0.071316	0.04477	0.00005	0.00601	0.001	2.998	-0.005	2
41	0.0000	0.026362	0.04465	0.00006	0.00598	0.000	2.997	-0.006	2
42	0.1000	0.124002	0.04450	0.00008	0.00593	0.001	2.996	-0.007	2
43	0.2000	0.221610	0.04432	0.00009	0.00588	0.000	2.995	-0.008	2
44	0.3000	0.319175	0.04410	0.00012	0.00582	0.000	2.994	-0.009	2
45	0.4000	0.416686	0.04382	0.00014	0.00575	0.000	2.992	-0.011	2
46	0.5000	0.514129	0.04351	0.00018	0.00567	0.000	2.989	-0.013	3
47	0.6000	0.611487	0.04312	0.00021	0.00557	0.001	2.985	-0.016	2
48	0.7000	0.708735	0.04265	0.00031	0.00536	0.001	2.978	-0.019	2
49	0.8000	0.805838	0.04204	0.00041	0.00515	0.002	2.966	-0.023	2
50	0.9000	0.902747	0.04061	0.00057	0.00486	0.004	2.945	-0.029	1
51	1.0000	0.999186	0.03819	0.00082	0.00443	0.011	2.904	-0.037	1
52	1.1000	1.097635	0.03384	0.00124	0.00384	0.031	2.813	-0.050	1
53	1.2000	1.195290	0.03153	0.00201	0.00289	0.107	2.567	-0.070	1
54	1.3000	1.291974	0.02771	0.00358	0.00125	0.603	1.626	-0.191	1
55	1.4000	1.387129	0.02011	-0.00311	0.00170	0.388	1.977	-0.111	1
56	1.5000	1.480884	0.01468	-0.00180	0.00319	0.079	2.647	-0.069	1
57	1.5000	1.573911	0.01358	-0.00111	0.00401	0.025	2.841	-0.047	1
58	1.6000	1.722263	0.01959	-0.00078	0.00457	0.009	2.918	-0.036	1
(Success)									
13	-2.4000	-2.311110	0.04262	0.00007	0.00549	0.000	3.010	0.001	1
14	-2.3000	-2.213937	0.04265	-0.00013	0.00554	0.000	3.028	0.001	1
15	-2.2000	-2.117205	0.04315	-0.00038	0.00580	0.000	3.104	0.010	1
16	-2.1000	-2.021161	0.04534	-0.00154	0.00651	0.028	3.291	0.038	1
17	-2.0000	-1.923875	0.05136	-0.00332	0.00851	0.091	3.363	0.129	1
18	-1.9000	-1.826072	0.05965	-0.00508	0.01121	0.121	3.171	0.165	1
19	-1.8000	-1.728078	0.07071	-0.01166	0.01375	0.361	2.752	-0.069	1
20	-1.7000	-1.630994	0.07825	0.00008	0.01472	0.000	2.532	-0.000	2
21	-1.6000	-1.534864	0.07542	0.00673	0.01330	0.064	2.724	-0.074	1
22	-1.5330	-1.469821	0.05913	0.00509	0.01117	0.123	3.181	-0.139	1
23	-1.4000	-1.290011	0.05014	0.00017	0.00846	0.079	3.364	0.125	1
24	-1.3330	-1.184928	0.04521	0.73191	0.00672	0.029	3.290	0.031	1
25	-1.2000	-1.091114	0.04308	0.00055	0.00587	0.004	3.181	0.010	1
26	-1.1000	-1.000881	0.04259	3.00512	0.03552	3.303	3.074	3.031	1
27	-1.0000	-0.909926	0.04237	-0.00007	0.00544	0.000	3.010	0.001	1
28	-0.9000	-0.817138	0.04261	-0.00014	0.00548	0.000	3.009	0.011	1
29	-0.8000	-0.723458	0.04293	-0.00015	0.00551	0.000	3.008	-0.856	1
30	-0.7000	-0.631163	0.04326	-0.00019	0.00561	0.000	2.997	-0.030	1
31	-0.6000	-0.537771	0.04357	-0.00013	0.00569	0.000	2.998	-0.019	1
32	-0.5000	-0.443716	0.04384	-0.00012	0.00576	0.000	2.998	-0.016	1
33	-0.4000	-0.349808	0.04407	-0.00011	0.00582	0.000	2.998	-0.011	1
34	-0.3000	-0.255250	0.04427	-0.00009	0.00587	0.000	2.997	-0.009	1
35	-0.2000	-0.159854	0.04444	-0.00007	0.00592	0.000	2.997	-0.008	1
36	-0.1000	-0.063823	0.04459	-0.00006	0.00596	0.000	2.998	-0.006	1
37	0.0000	0.031837	0.04471	-0.00005	0.00599	0.000	2.998	-0.005	1
38	0.1000	0.127521	0.04481	-0.00004	0.00602	0.000	2.998	-0.004	1
39	0.2000	0.223025	0.04490	-0.00004	0.00604	0.000	2.998	-0.003	1
40	0.3000	0.317468	0.04497	-0.00003	0.00606	0.000	2.999	-0.003	1
41	0.4000	0.411882	0.04501	-0.00002	0.00608	0.000	2.999	-0.002	1
42	0.5000	0.506308	0.04505	-0.00002	0.00609	0.000	2.999	-0.001	1
43	0.6000	0.600811	0.04511	-0.00001	0.00610	0.000	2.999	-0.001	1
44	0.7000	0.695444	0.04513	-0.00001	0.00611	0.000	2.999	-0.000	1
45	0.8000	0.790238	0.04514	-0.00000	0.00611	0.000	2.999	-0.000	1
46	0.9000	0.885235	0.04515	0.00000	0.00611	0.000	2.999	-0.000	1
47	1.0000	1.010640	0.04514	0.00001	0.00611	0.000	2.999	-0.000	1
48	1.1000	1.076081	0.04511	0.00001	0.00610	0.000	2.999	-0.000	1
49	1.2000	1.170944	0.04508	0.00002	0.00609	0.000	2.998	-0.001	1
50	1.3000	1.265926	0.04503	0.00003	0.00607	0.000	2.998	-0.002	1
51	1.4000	1.360960	0.04496	0.00004	0.00605	0.000	2.998	-0.002	1
52	1.5000	1.456057	0.04487	0.00005	0.00603	0.000	2.997	-0.003	1
53	1.6000	1.550952	0.04475	0.00006	0.00600	0.000	2.996	-0.004	1
54	1.7000	1.645117	0.04460	0.00008	0.00596	0.000	2.995	-0.005	1
55	1.8000	1.738743	0.04439	0.00011	0.00591	0.000	2.993	-0.007	1
56	1.9000	1.831119	0.04413	0.00014	0.00582	0.000	2.990	-0.009	1
57	2.0000	1.921828	0.04377	0.00019	0.00572	0.000	2.985	-0.011	1
58	2.1000	2.011746	0.04327	0.00027	0.00557	0.001	2.977	-0.014	1
59	2.2000	2.100556	0.04257	0.00039	0.00537	0.002	2.962	-0.018	2
60	2.3000	2.188543	0.04155	0.00054	0.00506	0.005	2.932	-0.024	2
61	2.4000	2.274477	0.03999	0.00081	0.00457	0.014	2.863	-0.033	1
62	2.5000	2.357256	0.03728	0.00132	0.00372	0.041	2.673	-0.048	1
63	2.6000	2.434463	0.03233	0.00219	0.00202	0.101	2.328	-0.088	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 7

Sub-ject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.49245	0.02995	-0.00408	0.00114	0.618	1.270	-0.164	1
16	-2.5000	-2.42016	0.03612	-0.00197	0.00333	0.082	2.549	-0.055	1
17	-2.4000	-2.33823	0.03981	-0.00109	0.00437	0.020	2.825	-0.036	1
18	-2.3000	-2.25101	0.04117	-0.00067	0.00494	0.006	2.917	-0.026	1
19	-2.2000	-2.16058	0.04234	-0.00044	0.00530	0.003	2.955	-0.019	2
20	-2.1000	-2.06808	0.04313	-0.00030	0.00553	0.001	2.974	-0.015	2
21	-2.0000	-1.97415	0.04368	-0.00021	0.00569	0.001	2.983	-0.012	8
22	-1.9000	-1.87920	0.04408	-0.00016	0.00581	0.000	2.989	-0.009	8
23	-1.8000	-1.78351	0.04437	-0.00012	0.00589	0.000	2.992	-0.008	8
24	-1.7000	-1.68726	0.04460	-0.00009	0.00596	0.000	2.994	-0.006	8
25	-1.6000	-1.59058	0.04477	-0.00007	0.00601	0.000	2.996	-0.005	8
26	-1.5100	-1.49357	0.04491	-0.00005	0.00604	0.000	2.997	-0.004	8
27	-1.4000	-1.39631	0.04501	-0.00004	0.00607	0.000	2.998	-0.003	8
28	-1.3000	-1.29885	0.04509	-0.00003	0.00610	0.000	2.998	-0.002	8
29	-1.2000	-1.20124	0.04515	-0.00002	0.00611	0.000	2.998	-0.002	8
30	-1.1000	-1.10351	0.04520	-0.00002	0.00613	0.000	2.999	-0.001	8
31	-1.0000	-1.00569	0.04523	-0.00001	0.00614	0.000	2.999	-0.001	8
32	-0.9000	-0.90782	0.04525	-0.00001	0.00614	0.000	2.999	-0.000	8
33	-0.8000	-0.80991	0.04526	-0.00000	0.00614	0.000	2.999	-0.000	8
34	-0.7100	-0.71199	0.04526	0.00000	0.00614	0.000	2.999	-0.000	8
35	-0.6000	-0.61407	0.04525	0.00001	0.00614	0.000	2.999	-0.000	8
36	-0.5000	-0.51619	0.04524	0.00001	0.00614	0.000	2.999	-0.000	8
37	-0.4100	-0.41836	0.04521	0.00002	0.00613	0.000	2.999	-0.001	8
38	-0.3000	-0.32060	0.04517	0.00002	0.00612	0.000	2.999	-0.001	8
39	-0.2000	-0.22294	0.04512	0.00003	0.00610	0.000	2.999	-0.002	8
40	-0.1000	-0.12541	0.04505	0.00003	0.00609	0.000	2.998	-0.003	8
41	0.0000	-0.02804	0.04497	0.00004	0.00606	0.000	2.998	-0.004	8
42	0.1000	0.06914	0.04487	0.00005	0.00603	0.000	2.997	-0.004	8
43	0.2000	0.16607	0.04474	0.00006	0.00600	0.000	2.997	-0.005	8
44	0.3000	0.26270	0.04459	0.00008	0.00596	0.000	2.996	-0.006	8
45	0.4000	0.35855	0.04439	0.00010	0.00590	0.000	2.994	-0.008	8
46	0.5000	0.45273	0.04415	0.00013	0.00583	0.000	2.992	-0.009	8
47	0.6300	0.56990	0.04383	0.00017	0.00574	0.000	2.989	-0.011	8
48	0.7300	0.66430	0.04342	0.00022	0.00562	0.001	2.984	-0.013	8
49	0.8000	0.73765	0.04286	0.00030	0.00547	0.001	2.975	-0.016	8
50	0.9000	0.82958	0.04208	0.00043	0.00524	0.002	2.959	-0.020	2
51	1.0000	0.91948	0.04096	0.00063	0.00491	0.006	2.926	-0.026	1
52	1.1000	1.00636	0.03923	0.00100	0.00439	0.017	2.850	-0.036	1
53	1.2000	1.08842	0.03637	0.00173	0.00349	0.062	2.615	-0.052	1
54	1.3000	1.16204	0.03109	0.00341	0.00170	0.386	1.758	-0.102	1
(Success)									
34	-0.7100	-0.81342	0.08502	-0.00672	0.01305	0.164	3.088	-0.406	1
35	-0.6000	-0.65757	0.07823	-0.00434	0.01564	0.039	2.556	-0.030	1
36	-0.5000	-0.48366	0.07580	-0.00309	0.01587	0.019	2.452	-0.013	2
37	-0.4000	-0.32250	0.06785	0.00679	0.01370	0.147	2.975	-0.233	1
38	-0.3000	-0.19086	0.05551	0.00506	0.01018	0.158	3.428	0.325	4
39	-0.2000	-0.08267	0.04644	0.00251	0.00744	0.063	3.450	0.068	4
40	-0.1000	0.01334	0.04288	0.00096	0.00601	0.012	3.268	0.017	7
41	0.0000	0.10455	0.04171	0.00023	0.00543	0.001	3.122	0.002	7
42	0.1000	0.19653	0.04158	-0.00007	0.00527	0.000	3.046	-0.000	7
43	0.2000	0.28674	0.04186	-0.00017	0.00528	0.000	3.013	0.012	8
44	0.3000	0.37571	0.04225	-0.00019	0.00535	0.000	3.000	-0.188	1
45	0.4000	0.46356	0.04265	-0.00018	0.00545	0.000	2.995	-0.027	1
46	0.5000	0.56020	0.04300	-0.00015	0.00554	0.000	2.994	-0.017	8
47	0.6000	0.65357	0.04331	-0.00013	0.00562	0.000	2.994	-0.012	8
48	0.7000	0.74755	0.04356	-0.00011	0.00568	0.000	2.995	-0.009	8
49	0.8000	0.84202	0.04377	-0.00008	0.00574	0.000	2.995	-0.006	8
50	0.9000	0.93689	0.04393	-0.00007	0.00578	0.000	2.996	-0.004	8
51	1.0000	1.03207	0.04405	-0.00005	0.00581	0.000	2.996	-0.002	8
52	1.1000	1.12746	0.04414	-0.00003	0.00584	0.000	2.996	-0.001	8
53	1.2300	1.22300	0.04418	-0.00001	0.00585	0.000	2.996	-0.000	8
54	1.3000	1.31861	0.04420	0.00000	0.00585	0.000	2.996	-0.000	8
55	1.4000	1.41420	0.04417	0.00002	0.00584	0.000	2.995	-0.000	8
56	1.5000	1.50970	0.04411	0.00004	0.00583	0.000	2.995	-0.001	8
57	1.6000	1.60500	0.04399	0.00007	0.00579	0.000	2.993	-0.003	8
58	1.7000	1.69998	0.04381	0.00010	0.00574	0.000	2.991	-0.005	8
59	1.8000	1.79448	0.04356	0.00015	0.00568	0.000	2.987	-0.007	8
60	1.9000	1.88830	0.04317	0.00021	0.00555	0.001	2.981	-0.010	8
61	2.0000	1.98112	0.04262	0.00030	0.00539	0.001	2.970	-0.014	2
62	2.1000	2.07250	0.04181	0.00046	0.00516	0.003	2.949	-0.019	2
63	2.2000	2.16171	0.04057	0.00071	0.00478	0.008	2.904	-0.027	1
64	2.3000	2.24750	0.03857	0.00119	0.00415	0.025	2.793	-0.038	1
65	2.4000	2.32756	0.03504	0.00220	0.00299	0.113	2.439	-0.061	1
66	2.5000	2.39865	0.02799	0.00473	0.00065	1.020	0.577	-0.568	4

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 8

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.50053	0.03211	-0.00329	0.00193	0.327	1.868	-0.092	1
16	-2.5000	-2.42493	0.03721	-0.00166	0.00308	0.054	2.681	-0.049	1
17	-2.4000	-2.34128	0.03594	-0.00095	0.00436	0.014	2.980	-0.033	1
18	-2.3000	-2.25296	0.04157	-0.00059	0.00506	0.005	2.931	-0.024	2
19	-2.2000	-2.16181	0.04262	-0.00040	0.00538	0.002	2.982	-0.018	2
20	-2.1000	-2.06814	0.04554	-0.00029	0.00559	0.001	2.977	-0.014	2
21	-2.0000	-1.97446	0.04586	-0.00020	0.00574	0.000	2.985	-0.011	8
22	-1.9000	-1.87919	0.04621	-0.00015	0.00585	0.000	2.990	-0.009	8
23	-1.8000	-1.78322	0.04669	-0.00011	0.00591	0.000	2.993	-0.008	8
24	-1.7000	-1.68823	0.04671	-0.00339	0.00599	0.001	2.995	-0.006	8
25	-1.6000	-1.58982	0.04688	-0.00007	0.00601	0.000	2.998	-0.005	8
26	-1.5000	-1.49259	0.04701	-0.00005	0.00607	0.000	2.998	-0.005	8
27	-1.4000	-1.39510	0.04712	-0.00004	0.00610	0.000	2.997	-0.004	8
28	-1.3000	-1.29750	0.04720	-0.00304	0.00611	0.000	2.998	-0.004	8
29	-1.2000	-1.19954	0.04727	-0.00001	0.00615	0.000	2.998	-0.003	8
30	-1.1000	-1.10155	0.04731	-0.00002	0.00616	0.000	2.999	-0.002	8
31	-1.0000	-1.00344	0.04737	-0.00002	0.00617	0.000	2.999	-0.002	8
32	-0.9000	-0.90525	0.04741	-0.00001	0.00618	0.000	2.999	-0.002	8
33	-0.8000	-0.80699	0.04744	-0.00001	0.00619	0.000	2.999	-0.001	8
34	-0.7000	-0.70867	0.04746	-0.00001	0.00620	0.000	2.999	-0.001	8
35	-0.6000	-0.61031	0.04748	-0.00001	0.00620	0.000	3.000	-0.000	8
36	-0.5000	-0.51192	0.04749	-0.00001	0.00621	0.000	3.000	-0.000	8
37	-0.4000	-0.41350	0.04750	-0.00001	0.00621	0.000	3.000	-0.000	8
38	-0.3000	-0.31506	0.04751	-0.00000	0.00621	0.000	3.000	-0.000	8
39	-0.2000	-0.21661	0.04751	-0.00001	0.00621	0.000	3.000	-0.000	8
40	-0.1000	-0.11815	0.04751	-0.00000	0.00621	0.000	3.000	-0.000	8
41	0.0000	-0.01969	0.04752	-0.00000	0.00622	0.000	3.000	-0.000	8
42	0.1000	0.07878	0.04752	-0.00000	0.00622	0.000	3.000	0.000	8
43	0.2000	0.17726	0.04752	-0.00000	0.00622	0.000	3.000	0.000	8
44	0.3000	0.27575	0.04753	-0.00001	0.00622	0.000	3.000	0.000	8
45	0.4000	0.37426	0.04754	-0.00001	0.00622	0.000	3.001	0.000	8
46	0.5000	0.47281	0.04757	-0.00001	0.00623	0.000	3.001	0.000	8
47	0.6000	0.57142	0.04760	-0.00002	0.00624	0.000	3.002	0.001	8
48	0.7000	0.67011	0.04764	-0.00001	0.00626	0.000	3.002	0.001	8
49	0.8000	0.76893	0.04771	-0.00004	0.00628	0.000	3.003	0.002	8
50	0.9000	0.86792	0.04781	-0.00005	0.00630	0.000	3.004	0.003	8
51	1.0000	0.96716	0.04794	-0.00107	0.00634	0.000	3.005	0.004	8
52	1.1000	1.06674	0.04812	-0.00009	0.00639	0.000	3.008	0.006	8
53	1.2000	1.16676	0.04834	-0.00012	0.00646	0.001	3.011	0.009	8
54	1.3000	1.26730	0.04866	-0.00016	0.00655	0.000	3.017	0.013	8
55	1.4000	1.36849	0.04909	-0.00019	0.00665	0.000	3.025	0.019	8
56	1.5000	1.47091	0.04968	-0.00022	0.00678	0.000	3.038	0.031	8
57	1.6000	1.57418	0.05080	-0.00025	0.00695	0.001	3.054	0.071	8
58	1.7000	1.67862	0.04855	-0.00126	0.00707	0.001	3.000	-0.190	1
59	1.8000	1.78426	0.04910	-0.00074	0.00722	0.001	2.994	-0.029	1
60	1.9000	1.89107	0.04994	-0.00070	0.00735	0.001	2.988	-0.010	8
61	2.0000	1.99892	0.04994	-0.00012	0.00744	0.000	2.984	-0.003	8
62	2.1000	2.10698	0.05011	-0.00001	0.00748	0.000	2.981	-0.000	8
63	2.2000	2.21536	0.05005	-0.00001	0.00747	0.000	2.982	-0.001	8
(Success)									
16	-2.5000	-2.58758	0.05104	-0.00136	0.00778	0.014	3.052	-0.168	4
17	-2.4000	-2.48671	0.05420	-0.00150	0.00838	0.014	2.991	-0.178	1
18	-2.3000	-2.39411	0.05218	-0.00118	0.00851	0.007	2.910	-0.027	1
19	-2.2000	-2.27230	0.05481	-0.00028	0.00889	0.000	2.856	-0.001	2
20	-2.1000	-2.09525	0.05027	-0.00076	0.00876	0.003	2.875	-0.008	2
21	-2.0000	-2.02842	0.05583	-0.00141	0.00919	0.011	2.967	-0.061	1
22	-1.9000	-1.94574	0.05261	-0.00143	0.00833	0.015	3.024	-3.680	4
23	-1.8000	-1.85622	0.04984	-0.00122	0.00756	0.012	3.067	-0.094	4
24	-1.7000	-1.76104	0.04750	-0.00085	0.00690	0.007	3.073	-0.041	4
25	-1.6000	-1.66135	0.04581	-0.00054	0.00645	0.003	3.059	-0.020	7
26	-1.5000	-1.56011	0.04501	-0.00031	0.00618	0.001	3.041	-0.010	7
27	-1.4000	-1.45588	0.04451	-0.00017	0.00599	0.000	3.026	-0.005	7
28	-1.3000	-1.35285	0.04425	-0.00008	0.00590	0.000	3.016	-0.002	8
29	-1.2000	-1.24943	0.04413	-0.00003	0.00586	0.000	3.009	-0.000	8
30	-1.1000	-1.14946	0.04410	-0.00000	0.00584	0.000	3.004	0.000	8
31	-1.0000	-1.03927	0.04411	-0.00001	0.00584	0.000	3.001	0.000	8
32	-1.1000	-1.13671	0.04411	-0.00001	0.00584	0.000	3.000	-0.001	8
33	-1.2000	-1.23819	0.04414	-0.10000	0.00584	0.000	2.998	-0.000	8
34	-1.3000	-1.33988	0.04414	-0.00000	0.00584	0.000	2.998	-0.000	8
35	-1.4000	-1.42116	0.04413	-0.00002	0.00583	0.000	2.997	-0.000	8
36	-1.5000	-1.51658	0.04407	-0.00003	0.00582	0.000	2.995	-0.001	8
37	-1.6000	-1.61191	0.04398	-0.00004	0.00579	0.000	2.994	-0.002	8
38	-1.7000	-1.70781	0.04386	-0.00008	0.00575	0.000	2.993	-0.004	8
39	-1.8000	-1.80144	0.04383	-0.00015	0.00569	0.000	2.990	-0.006	8
40	-1.9000	-1.89552	0.04383	-0.00017	0.00560	0.000	2.985	-0.008	8
41	-2.0000	-1.99882	0.04290	-0.00024	0.00548	0.001	2.977	-0.012	8
42	-2.1000	-2.08098	0.04236	-0.00035	0.00529	0.002	2.963	-0.018	2
43	-2.2000	-2.17146	0.04132	-0.00054	0.00501	0.004	2.935	-0.032	2
44	-2.3000	-2.25937	0.03984	-0.00068	0.00458	0.012	2.873	-0.031	1
45	-2.4000	-2.34314	0.03737	-0.00144	0.00378	0.033	2.704	-0.045	1
46	-2.5000	-2.41962	0.03284	-0.00290	0.00224	0.238	2.078	-0.079	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 9

Subject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
14	-2.7000	-2.59335	0.03178	-0.00344	0.00150	0.368	1.777	-0.098	1
15	-2.6000	-2.51792	0.01708	-0.00172	0.00363	0.058	2.643	-0.050	1
16	-2.5000	-2.43437	0.01990	-0.00098	0.00454	0.015	2.854	-0.034	1
17	-2.4000	-2.34610	0.04158	-0.00061	0.00506	0.005	2.928	-0.025	2
18	-2.3000	-2.25491	0.04266	-0.00040	0.00539	0.002	2.961	-0.019	2
19	-2.2000	-2.16179	0.04339	-0.00026	0.00560	0.001	2.976	-0.015	8
20	-2.1000	-2.06736	0.04391	-0.00020	0.00575	0.000	2.985	-0.012	8
21	-2.0000	-1.97192	0.04429	-0.00015	0.00586	0.000	2.990	-0.009	8
22	-1.9000	-1.87570	0.04458	-0.00012	0.00595	0.000	2.993	-0.008	8
23	-1.8000	-1.77911	0.04480	-0.00009	0.00601	0.000	2.995	-0.007	8
24	-1.7000	-1.68200	0.04497	-0.00007	0.00606	0.000	2.996	-0.006	8
25	-1.6000	-1.58456	0.04511	-0.00006	0.00610	0.000	2.997	-0.005	8
26	-1.5000	-1.48685	0.04522	-0.00005	0.00613	0.000	2.998	-0.004	8
27	-1.4000	-1.38893	0.04531	-0.00004	0.00616	0.000	2.998	-0.003	8
28	-1.3000	-1.29082	0.04538	-0.00003	0.00618	0.000	2.999	-0.003	8
29	-1.2000	-1.19258	0.04544	-0.00003	0.00619	0.000	2.999	-0.002	8
30	-1.1000	-1.09421	0.04549	-0.00002	0.00621	0.000	2.999	-0.002	8
31	-1.0000	-0.99575	0.04553	-0.00002	0.00622	0.000	2.999	-0.001	8
32	-0.9000	-0.89721	0.04557	-0.00001	0.00623	0.000	2.999	-0.001	8
33	-0.8000	-0.79861	0.04559	-0.00001	0.00623	0.000	2.999	-0.001	8
34	-0.7000	-0.69996	0.04561	-0.00001	0.00624	0.000	2.999	-0.000	8
35	-0.6000	-0.60127	0.04563	-0.00001	0.00624	0.000	2.999	-0.000	8
36	-0.5000	-0.50256	0.04564	-0.00000	0.00625	0.000	3.000	-0.000	4
37	-0.4000	-0.40383	0.04564	-0.00000	0.00625	0.000	3.000	-0.000	8
38	-0.3000	-0.30509	0.04564	0.00000	0.00625	0.000	3.000	-0.000	8
39	-0.2000	-0.20636	0.04564	0.00000	0.00625	0.000	3.000	-0.000	8
40	-0.1000	-0.10764	0.04563	0.00000	0.00624	0.000	3.000	-0.000	8
41	0.0000	-0.00894	0.04562	0.00001	0.00624	0.000	2.999	-0.000	8
42	0.1000	0.08972	0.04560	0.00001	0.00624	0.000	2.999	-0.001	8
43	0.2000	0.18834	0.04557	0.00001	0.00623	0.000	2.999	-0.001	8
44	0.3000	0.28690	0.04554	0.00002	0.00622	0.000	2.999	-0.001	8
45	0.4000	0.38539	0.04551	0.00002	0.00621	0.000	2.999	-0.002	8
46	0.5000	0.48378	0.04546	0.00002	0.00620	0.000	2.999	-0.002	8
47	0.6000	0.58207	0.04540	0.00003	0.00618	0.000	2.999	-0.003	8
48	0.7000	0.68022	0.04534	0.00003	0.00616	0.000	2.998	-0.003	8
49	0.8000	0.77822	0.04525	0.00004	0.00614	0.000	2.998	-0.004	8
50	0.9000	0.87601	0.04515	0.00005	0.00611	0.000	2.998	-0.004	8
51	1.0000	0.97356	0.04503	0.00006	0.00608	0.000	2.997	-0.005	8
52	1.1000	1.07080	0.04487	0.00008	0.00603	0.000	2.996	-0.006	8
53	1.2000	1.16767	0.04467	0.00010	0.00597	0.000	2.994	-0.007	8
54	1.3000	1.26406	0.04442	0.00013	0.00590	0.000	2.992	-0.009	8
55	1.4000	1.35979	0.04408	0.00018	0.00581	0.000	2.988	-0.011	8
56	1.5000	1.45470	0.04364	0.00024	0.00568	0.001	2.981	-0.013	8
57	1.6000	1.54867	0.04302	0.00034	0.00549	0.001	2.969	-0.017	2
58	1.7000	1.64063	0.04212	0.00050	0.00523	0.001	2.947	-0.021	2
59	1.8000	1.73040	0.04077	0.00078	0.00482	0.004	2.898	-0.029	1
60	1.9000	1.81666	0.03859	0.00130	0.00413	0.029	2.773	-0.041	1
61	2.0000	1.89622	0.03474	0.00242	0.00284	0.140	2.357	-0.069	1
(Success)									
47	0.6000	0.78792	0.10740	0.04761	0.04496	1.810	3.897	-0.583	1
48	0.7000	0.93528	0.04173	0.01385	0.01663	2.643	9.549	0.663	5
49	0.8000	1.00721	0.02932	0.00386	0.00494	0.329	5.749	0.004	7
50	0.9000	1.07126	0.03065	-0.00134	0.00305	0.063	3.269	0.154	4
51	1.0000	1.14084	0.03368	-0.00134	0.00328	0.047	2.889	-0.098	1
52	1.1000	1.21659	0.03629	-0.00102	0.00379	0.022	2.889	-0.057	1
53	1.2000	1.29713	0.03813	-0.00076	0.00425	0.010	2.921	-0.040	1
54	1.3000	1.38116	0.03948	-0.00053	0.00459	0.004	2.946	-0.028	1
55	1.4000	1.46768	0.04044	-0.00037	0.00484	0.002	2.962	-0.019	2
56	1.5000	1.55593	0.04111	-0.00025	0.00502	0.001	2.971	-0.011	2
57	1.6000	1.64537	0.04154	-0.00018	0.00514	0.000	2.977	-0.005	8
58	1.7000	1.73554	0.04179	-0.00007	0.00520	0.000	2.979	-0.001	8
59	1.8000	1.82605	0.04186	0.00001	0.00522	0.000	2.978	-0.000	8
60	1.9000	1.91650	0.04178	0.00010	0.00518	0.000	2.973	-0.002	2
61	2.0000	2.00669	0.04161	0.00022	0.00508	0.001	2.963	-0.007	2
62	2.1000	2.09644	0.04081	0.00038	0.00489	0.002	2.942	-0.011	2
63	2.2000	2.18255	0.03967	0.00065	0.00456	0.007	2.897	-0.023	2
64	2.3000	2.26652	0.03778	0.00114	0.00397	0.024	2.782	-0.046	1
65	2.4000	2.34493	0.03435	0.00216	0.00285	0.115	2.513	-1.360	1
66	2.5000	2.41268	0.02739	0.00470	0.00035	1.073	0.566	0.287	4

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 3 CASE: Item 10

Sub-ject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
14	-2.7000	-2.60457	0.03568	-0.00252	0.00275	0.155	2.313	-0.068	1
15	-2.6000	-2.52551	0.03867	-0.00134	0.00409	0.032	2.162	-0.042	1
16	-2.5000	-2.43985	0.04072	-0.00080	0.00480	0.009	2.054	-0.024	1
17	-2.4000	-2.34496	0.04210	-0.00051	0.00522	0.003	2.005	-0.022	2
18	-2.3000	-2.25384	0.04301	-0.00035	0.00549	0.002	2.008	-0.017	2
19	-2.2000	-2.16407	0.04364	-0.00025	0.00568	0.001	2.001	-0.013	2
20	-2.1000	-2.08914	0.04410	-0.00018	0.00581	0.000	2.007	-0.011	2
21	-2.0000	-1.97116	0.04444	-0.00014	0.00591	0.000	2.001	-0.009	2
22	-1.9000	-1.87693	0.04469	-0.00010	0.00598	0.000	2.004	-0.007	2
23	-1.8000	-1.78002	0.04490	-0.00008	0.00604	0.000	2.006	-0.006	2
24	-1.7000	-1.68271	0.04506	-0.00007	0.00608	0.000	2.007	-0.005	2
25	-1.6000	-1.58510	0.04518	-0.00005	0.00612	0.000	2.008	-0.005	2
26	-1.5000	-1.48723	0.04529	-0.00004	0.00615	0.000	2.009	-0.004	2
27	-1.4000	-1.38916	0.04537	-0.00004	0.00617	0.000	2.009	-0.004	2
28	-1.3000	-1.29093	0.04544	-0.00003	0.00619	0.000	2.009	-0.003	2
29	-1.2000	-1.19259	0.04550	-0.00002	0.00621	0.000	2.009	-0.003	2
30	-1.1000	-1.09416	0.04555	-0.00002	0.00622	0.000	2.009	-0.002	2
31	-1.0000	-0.99567	0.04559	-0.00002	0.00623	0.000	2.009	-0.002	2
32	-0.9000	-0.89713	0.04563	-0.00001	0.00624	0.000	2.009	-0.002	2
33	-0.8000	-0.79856	0.04566	-0.00001	0.00625	0.000	2.009	-0.001	2
34	-0.7000	-0.69997	0.04568	-0.00001	0.00626	0.000	2.009	-0.001	2
35	-0.6000	-0.60141	0.04570	-0.00001	0.00626	0.000	2.009	-0.001	2
36	-0.5000	-0.50288	0.04571	-0.00001	0.00627	0.000	2.009	-0.001	2
37	-0.4000	-0.40438	0.04573	-0.00000	0.00627	0.000	2.009	-0.000	2
38	-0.3000	-0.30592	0.04573	-0.00000	0.00627	0.000	2.009	-0.000	2
39	-0.2000	-0.20751	0.04574	-0.00000	0.00628	0.000	2.009	-0.000	2
40	-0.1000	-0.10916	0.04574	-0.00000	0.00628	0.000	2.009	-0.000	2
41	0.0000	-0.00086	0.04574	0.00000	0.00628	0.000	2.009	-0.000	2
42	0.1000	0.09210	0.04574	0.00000	0.00628	0.000	2.009	-0.000	2
43	0.2000	0.19105	0.04574	0.00000	0.00628	0.000	2.009	-0.000	2
44	0.3000	0.28998	0.04573	0.00000	0.00627	0.000	2.009	-0.000	2
45	0.4000	0.38890	0.04572	0.00001	0.00627	0.000	2.009	-0.000	2
46	0.5000	0.48778	0.04570	0.00001	0.00627	0.000	2.009	-0.000	2
47	0.6000	0.58664	0.04569	0.00001	0.00626	0.000	2.009	-0.001	2
48	0.7000	0.68548	0.04566	0.00001	0.00625	0.000	2.009	-0.001	2
49	0.8000	0.78431	0.04564	0.00001	0.00625	0.000	2.009	-0.001	2
50	0.9000	0.88291	0.04561	0.00001	0.00624	0.000	2.009	-0.001	2
51	1.0000	0.98154	0.04557	0.00002	0.00623	0.000	2.009	-0.002	2
52	1.1000	1.08008	0.04554	0.00002	0.00622	0.000	2.009	-0.002	2
53	1.2000	1.17853	0.04548	0.00003	0.00620	0.000	2.009	-0.002	2
54	1.3000	1.27686	0.04542	0.00003	0.00619	0.000	2.009	-0.001	2
55	1.4000	1.37505	0.04535	0.00004	0.00617	0.000	2.009	-0.001	2
56	1.5000	1.47307	0.04527	0.00005	0.00614	0.000	2.009	-0.001	2
57	1.6000	1.57089	0.04517	0.00005	0.00611	0.000	2.008	-0.004	2
58	1.7000	1.66846	0.04506	0.00006	0.00608	0.000	2.008	-0.005	2
59	1.8000	1.75574	0.04489	0.00008	0.00604	0.000	2.007	-0.005	2
60	1.9000	1.86265	0.04470	0.00010	0.00598	0.000	2.006	-0.006	2
61	2.0000	1.95909	0.04445	0.00013	0.00591	0.000	2.004	-0.007	2
62	2.1000	2.05493	0.04414	0.00017	0.00582	0.000	2.002	-0.009	2
63	2.2000	2.14998	0.04372	0.00022	0.00570	0.001	2.000	-0.010	2
64	2.3000	2.24397	0.04314	0.00031	0.00553	0.001	2.981	-0.013	2
65	2.4000	2.33663	0.04233	0.00045	0.00529	0.003	2.973	-0.016	2
66	2.5000	2.42682	0.04111	0.00069	0.00491	0.007	2.954	-0.020	2
67	2.6000	2.51385	0.03919	0.00111	0.00433	0.021	2.914	-0.027	2
68	2.7000	2.59552	0.03589	0.00204	0.00345	0.090	2.818	-0.037	1
69	2.8000	2.66674	0.02946	0.00428	0.00098	0.712	2.522	-0.057	1
							1.103	-0.222	1
(Success)									
44	0.3000	0.21272	0.05006	-0.00119	0.00765	0.011	3.055	0.111	4
45	0.4000	0.32604	0.05290	-0.00139	0.00842	0.015	3.009	-0.036	1
46	0.5000	0.44168	0.05581	-0.00122	0.00915	0.009	2.936	-0.052	1
47	0.6000	0.56004	0.05740	-0.00053	0.00981	0.001	2.876	-0.004	2
48	0.7000	0.67034	0.05792	-0.00041	0.00983	0.001	2.871	-0.003	2
49	0.8000	0.81501	0.05810	-0.00118	0.00920	0.008	2.924	-0.034	1
50	0.9000	0.93232	0.05819	-0.00143	0.00848	0.014	2.998	-0.031	1
51	1.0000	1.06609	0.05820	-0.00128	0.00789	0.013	3.051	0.155	4
52	1.1000	1.19505	0.05778	0.00005	0.00700	0.008	3.068	0.057	4
53	1.2000	1.25132	0.04605	0.10065	0.00449	0.004	3.061	0.030	4
54	1.3000	1.34963	0.04592	-0.00041	0.00414	0.002	3.055	0.017	1
55	1.4000	1.44960	0.04577	0.00035	0.00582	0.001	3.029	0.010	2
56	1.5000	1.54114	0.04378	0.00018	0.00578	0.000	3.016	0.008	2
57	1.6000	1.63351	0.04168	0.00012	0.00569	0.000	3.007	0.009	2
58	1.7000	1.72931	0.04325	0.00010	0.00561	0.000	3.000	-0.112	1
59	1.8000	1.82263	0.04302	0.00011	0.00556	0.000	2.994	-0.010	2
60	1.9000	1.91561	0.04274	0.00015	0.00548	0.000	2.988	-0.009	2
61	2.0000	2.00747	0.04235	0.00021	0.00534	0.001	2.979	-0.010	2
62	2.1000	2.09851	0.04178	0.00032	0.00518	0.001	2.965	-0.014	2
63	2.2000	2.18804	0.04093	0.00049	0.00492	0.004	2.948	-0.020	2
64	2.3000	2.27523	0.03957	0.00079	0.00451	0.010	2.880	-0.028	1
65	2.4000	2.35860	0.03730	0.00138	0.00379	0.030	2.728	-0.042	1
66	2.5000	2.43527	0.03314	0.00265	0.00241	0.193	2.191	-0.072	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 1

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
10	-3.1000	-3.45021	0.01747	-0.00073	0.00021	0.099	20.330	0.005	7
11	-3.0000	-3.39417	0.04796	-0.01921	0.04441	13.992	19.324	-5.126	1
12	-[illegible]9000	-3.12671	0.22202	-0.08735	0.05036	0.647	1.634	-0.175	1
13	-2.9000	-2.82315	0.18038	0.10290	0.09099	2.567	3.938	-0.842	1
14	-2.7000	-2.44393	0.02842	0.02019	0.02633	18.067	31.012	23.841	6
15	-2.6000	-2.43137	0.01553	-0.00119	0.00324	0.140	13.422	0.025	7
16	-2.5000	-2.37915	0.02056	-0.00252	0.00037	0.732	2.298	-0.204	1
17	-2.4000	-2.32546	0.02504	-0.00157	0.00140	0.156	2.219	-0.069	1
18	-2.3000	-2.27240	0.02735	-0.00060	0.00183	0.018	2.444	-0.012	2
19	-2.2000	-2.21751	0.02771	0.00027	0.00190	0.003	2.477	-0.002	2
20	-2.1000	-2.15930	0.02615	0.00119	0.00160	0.019	2.335	-0.039	1
21	-2.0000	-2.10083	0.02249	0.00221	0.00107	0.428	2.120	-0.128	1
22	-1.9000	-2.05181	0.01712	0.00238	0.00161	1.127	3.489	0.685	4
23	-1.8000	-2.02321	0.01818	-0.00765	0.01240	8.266	37.534	0.612	4
24	-1.7000	-1.93357	0.08792	-0.07238	0.07182	3.709	4.266	-1.984	1
25	-1.6000	-1.53583	0.25988	-0.00479	0.06239	0.001	0.924	-0.000	2
26	-1.5000	-1.12402	0.09358	0.01528	0.07459	0.916	8.518	-1.171	1
27	-1.4000	-1.02333	0.02035	0.00743	0.01366	6.558	32.689	0.677	4
(Success)									
17	-2.4010	-2.29723	0.32893	-0.01652	0.00076	0.844	0.878	-0.477	1
18	-2.3000	-2.22640	0.03571	-0.00214	0.00117	0.101	2.488	-0.059	1
19	-2.2000	-2.14503	0.03917	-0.00118	0.00151	0.023	2.639	-0.030	1
20	-2.1000	-2.05797	0.04117	-0.00072	0.00193	0.307	2.911	-0.024	1
21	-2.0000	-1.96745	0.04241	-0.00047	0.00232	0.003	2.951	-0.021	2
22	-1.9000	-1.87463	0.04329	-0.00033	0.00257	0.001	2.973	-0.017	2
23	-1.8010	-1.78134	0.04393	-0.00024	0.00275	0.001	2.983	-0.014	2
24	-1.7000	-1.68466	0.04415	-0.00018	0.00288	0.000	2.986	-0.012	2
25	-1.6010	-1.58752	0.04470	-0.00014	0.00298	0.000	2.991	-0.011	2
26	-1.5000	-1.48150	0.04498	-0.00012	0.00306	0.000	2.994	-0.010	2
27	-1.4010	-1.38394	0.04521	-0.00010	0.00312	0.000	2.996	-0.010	2
28	-1.3010	-1.28982	0.04540	-0.00008	0.00318	0.000	2.997	-0.009	2
29	-1.2000	-1.19752	0.04557	-0.00007	0.00322	0.000	2.998	-0.009	2
30	-1.1000	-1.09878	0.04571	-0.00006	0.00327	0.000	2.998	-0.009	2
31	-1.0000	-0.99975	0.04584	-0.00006	0.00330	0.000	2.999	-0.008	2
32	-0.9010	-0.90161	0.04595	-0.00005	0.00333	0.000	2.999	-0.007	2
33	-0.8010	-0.80094	0.04605	-0.00004	0.00336	0.000	2.999	-0.006	2
34	-0.7010	-0.70122	0.04614	-0.00004	0.00339	0.000	2.999	-0.005	2
35	-0.6000	-0.60110	0.04622	-0.00003	0.00341	0.000	2.999	-0.004	2
36	-0.5000	-0.50121	0.04629	-0.00003	0.00343	0.000	2.999	-0.003	2
37	-0.4000	-0.40102	0.04635	-0.00002	0.00344	0.000	2.999	-0.002	2
38	-0.3010	-0.30070	0.04640	-0.00002	0.00345	0.000	2.999	-0.001	2
39	-0.2010	-0.20010	0.04643	-0.00001	0.00346	0.000	2.999	-0.001	2
40	-0.1010	-0.09981	0.04645	-0.00001	0.00347	0.000	2.999	-0.000	2
41	0.0010	0.00067	0.04646	-0.00000	0.00347	0.000	2.999	-0.000	2
42	0.1000	0.10119	0.04646	0.00000	0.00347	0.000	2.999	-0.000	2
43	0.2010	0.20168	0.04644	0.00001	0.00347	0.000	2.999	-0.000	2
44	0.3010	0.30214	0.04642	0.00001	0.00346	0.000	2.999	-0.001	2
45	0.4010	0.40254	0.04638	0.00002	0.00345	0.000	2.999	-0.001	2
46	0.5010	0.50278	0.04633	0.00003	0.00344	0.000	2.999	-0.002	2
47	0.6010	0.60294	0.04627	0.00003	0.00342	0.000	2.999	-0.003	2
48	0.7010	0.70296	0.04620	0.00004	0.00340	0.000	2.999	-0.004	2
49	0.8010	0.80282	0.04612	0.00004	0.00336	0.000	2.999	-0.006	2
50	0.9000	0.90250	0.04603	0.00004	0.00333	0.000	2.999	-0.007	2
51	1.0010	1.00198	0.04593	0.00005	0.00330	0.000	2.999	-0.008	2
52	1.1010	1.10121	0.04583	0.00005	0.00326	0.000	2.999	-0.009	2
53	1.2000	1.20024	0.04571	0.00006	0.00321	0.000	2.999	-0.009	2
54	1.3010	1.29907	0.04557	0.00007	0.00317	0.000	2.998	-0.009	2
55	1.4010	1.39769	0.04542	0.00008	0.00311	0.000	2.998	-0.009	2
56	1.5000	1.49548	0.04524	0.00009	0.00305	0.000	2.997	-0.010	2
57	1.6010	1.59310	0.04503	0.00011	0.00297	0.000	2.995	-0.010	2
58	1.7000	1.69025	0.04477	0.00013	0.00288	0.000	2.993	-0.010	2
59	1.8010	1.78678	0.04446	0.00016	0.00278	0.000	2.991	-0.012	2
60	1.9000	1.88254	0.04405	0.00021	0.00259	0.001	2.988	-0.013	2
61	2.0010	1.97729	0.04352	0.00029	0.00244	0.001	2.977	-0.016	2
62	2.1010	2.07068	0.04278	0.00041	0.00242	0.002	2.982	-0.019	2
63	2.2010	2.16211	0.04170	0.00060	0.00250	0.005	2.991	-0.025	2
64	2.3010	2.25084	0.04005	0.00096	0.00299	0.014	2.981	-0.036	1
65	2.4000	2.33651	0.03710	0.00187	0.00371	0.054	2.664	-0.069	1
66	2.5000	2.41844	0.03220	0.00329	0.00195	0.124	1.879	-0.092	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 2

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
18	-2.5100	-2.25870	0.03367	-0.00233	0.00259	0.143	2.312	-0.064	1
19	-2.4100	-2.23599	0.03314	-0.00121	0.00340	0.021	2.353	-0.017	1
20	-2.3100	-2.20320	0.03912	-0.00068	0.00442	0.008	2.885	-0.023	2
21	-2.2100	-2.01135	0.04024	-0.00039	0.00476	0.002	2.931	-0.013	2
22	-2.1100	-1.97166	0.04081	-0.00021	0.00494	0.001	2.960	-0.006	2
23	-2.0100	-1.93366	0.04118	-0.00009	0.00504	0.000	2.971	-0.001	2
24	-1.9100	-1.89562	0.04126	0.00001	0.00507	0.000	2.977	-0.000	5
25	-1.8100	-1.85824	0.04116	0.00008	0.00505	0.000	2.981	-0.002	5
26	-1.7100	-1.82344	0.04091	0.00015	0.00499	0.000	2.984	-0.003	5
27	-1.6100	-1.79332	0.04054	0.00019	0.00492	0.001	2.992	-0.023	5
28	-1.5100	-1.76209	0.04011	0.00019	0.00484	0.001	3.012	-0.020	4
29	-1.4100	-1.73515	0.03979	0.00007	0.00485	0.000	3.067	0.000	1
30	-1.3100	-1.71951	0.04001	-0.00036	0.00513	0.002	3.204	0.004	1
31	-1.2000	-1.71146	0.04183	-0.00134	0.00604	0.033	3.474	-0.029	4
32	-1.0000	-1.73553	0.04778	-0.00422	0.00857	0.163	3.732	0.132	4
33	-0.8000	-0.91921	0.06123	-0.00823	0.01288	0.295	3.435	-15.800	4
34	-0.7000	-0.76588	0.08057	-0.00814	0.01709	0.127	2.819	-0.087	1
35	-0.6000	-0.67883	0.08855	0.00196	0.01502	0.005	2.299	-0.003	2
36	-0.5000	-0.33005	0.07453	0.00920	0.01598	0.205	2.880	-0.190	1
37	-0.4000	-0.25940	0.05605	0.00661	0.01136	0.233	3.016	0.529	4
38	-0.3100	-0.15118	0.04541	0.00312	0.00758	0.104	3.014	0.018	4
39	-0.2000	-0.05825	0.04124	0.00100	0.00571	0.014	3.110	0.016	4
(Success)									
16	-2.5000	-2.30061	0.03485	-0.00247	0.00285	0.164	2.365	-0.066	1
17	-2.4000	-2.32654	0.03879	-0.00132	0.00417	0.030	2.771	-0.041	1
18	-2.3000	-2.24004	0.04101	-0.00079	0.00483	0.009	2.897	-0.029	1
19	-2.2000	-2.14535	0.04238	-0.00051	0.00529	0.001	2.947	-0.022	2
20	-2.1000	-2.05781	0.04329	-0.00034	0.00555	0.001	2.969	-0.017	2
21	-2.0000	-1.98267	0.04392	-0.00025	0.00575	0.001	2.981	-0.013	5
22	-1.9000	-1.88715	0.04437	-0.00018	0.00588	0.000	2.988	-0.011	5
23	-1.8000	-1.77011	0.04471	-0.00014	0.00599	0.000	2.992	-0.009	5
24	-1.7100	-1.67376	0.04497	-0.00010	0.00606	0.000	2.994	-0.007	5
25	-1.6000	-1.51824	0.04513	-0.00008	0.00611	0.000	2.996	-0.006	5
26	-1.5000	-1.47814	0.04523	-0.00007	0.00615	0.000	2.997	-0.005	5
27	-1.4000	-1.38013	0.04546	-0.00005	0.00618	0.000	2.998	-0.004	5
28	-1.3000	-1.28158	0.04556	-0.00004	0.00622	0.000	2.998	-0.004	5
29	-1.2000	-1.14307	0.04564	-0.00003	0.00625	0.000	2.998	-0.003	5
30	-1.1100	-1.04421	0.04571	-0.00003	0.00627	0.000	2.999	-0.002	5
31	-1.0000	-0.98528	0.04578	-0.00002	0.00628	0.000	2.999	-0.002	5
32	-0.9000	-0.88631	0.04581	-0.00002	0.00629	0.000	2.999	-0.002	5
33	-0.8000	-0.78703	0.04584	-0.00001	0.00630	0.000	2.999	-0.001	5
34	-0.7000	-0.68786	0.04587	-0.00001	0.00631	0.000	2.999	-0.001	5
35	-0.6100	-0.59851	0.04589	-0.00001	0.00632	0.000	2.999	-0.001	5
36	-0.5100	-0.49931	0.04591	-0.00001	0.00632	0.000	2.999	-0.000	5
37	-0.4000	-0.38999	0.04592	-0.00000	0.00632	0.000	2.999	-0.000	5
38	-0.3000	-0.29064	0.04592	-0.00000	0.00631	0.000	3.000	-0.000	5
39	-0.2000	-0.19130	0.04592	0.00000	0.00631	0.000	3.000	-0.000	5
40	-0.1100	-0.09198	0.04592	0.00000	0.00631	0.000	3.000	-0.000	5
41	0.0000	0.00732	0.04592	0.00000	0.00631	0.000	3.000	-0.000	5
42	0.1000	0.10631	0.04592	0.00000	0.00632	0.000	3.000	-0.000	5
43	0.2000	0.20600	0.04591	0.00001	0.00632	0.000	3.000	-0.000	5
44	0.3000	0.30523	0.04589	0.00001	0.00632	0.000	3.000	-0.000	5
45	0.4000	0.40353	0.04588	0.00001	0.00631	0.000	3.000	-0.001	5
46	0.5000	0.50167	0.04585	0.00001	0.00631	0.000	3.000	-0.001	5
47	0.6000	0.59979	0.04583	0.00001	0.00630	0.000	3.000	-0.001	5
48	0.7000	0.70255	0.04580	0.00001	0.00629	0.000	3.000	-0.001	5
49	0.8000	0.80053	0.04577	0.00002	0.00628	0.000	2.999	-0.002	5
50	0.9100	0.90033	0.04574	0.00002	0.00627	0.000	2.999	-0.002	5
51	1.0000	0.99815	0.04569	0.00002	0.00626	0.000	2.999	-0.002	5
52	1.1000	1.09810	0.04564	0.00003	0.00625	0.000	2.999	-0.003	5
53	1.2000	1.19819	0.04558	0.00003	0.00623	0.000	2.999	-0.003	5
54	1.3000	1.29810	0.04551	0.00003	0.00621	0.000	2.999	-0.003	5
55	1.4000	1.39810	0.04543	0.00004	0.00619	0.000	2.998	-0.004	5
56	1.5000	1.49828	0.04533	0.00005	0.00616	0.000	2.998	-0.004	5
57	1.6000	1.60021	0.04522	0.00006	0.00613	0.000	2.998	-0.005	5
58	1.7000	1.69700	0.04507	0.00007	0.00609	0.000	2.997	-0.005	5
59	1.8000	1.79855	0.04490	0.00008	0.00604	0.000	2.996	-0.006	5
60	1.9000	1.89211	0.04467	0.00010	0.00598	0.000	2.995	-0.007	5
61	2.0100	1.97410	0.04439	0.00011	0.00589	0.000	2.993	-0.008	5
62	2.1000	2.06676	0.04400	0.00013	0.00578	0.000	2.990	-0.010	5
63	2.2000	2.18517	0.04339	0.00015	0.00564	0.001	2.985	-0.012	5
64	2.3000	2.25160	0.04239	0.00018	0.00543	0.002	2.978	-0.014	5
65	2.4000	2.34260	0.04075	0.00020	0.00511	0.005	2.963	-0.018	5
66	2.5000	2.43662	0.03815	0.00021	0.00462	0.011	2.933	-0.024	5
67	2.6000	2.50292	0.03448	0.00167	0.00378	0.050	2.878	-0.044	4
			0.33291	0.10314	0.00206	0.294	1.948	-0.087	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 3

Subject	$\hat{\theta}$	Mean	Conditional Moments Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
16	-2.4000	-2.45560	0.02573	-0.00165	0.00088	0.182	1.331	-0.211	1
17	-2.4000	-2.38694	0.03181	-0.00200	0.00248	0.127	2.484	-0.071	1
18	-2.4000	-2.32561	0.03496	-0.00110	0.00339	0.033	2.774	-0.025	1
19	-2.3000	-2.24885	0.03496	-0.00071	0.00333	0.010	2.829	-0.025	1
20	-2.3000	-2.18523	0.03417	-0.00042	0.00328	0.001	2.924	-0.015	1
21	-2.2000	-2.09149	0.03385	-0.00021	0.00333	0.001	2.955	-0.005	1
22	-2.2000	-2.03749	0.03411	-0.00005	0.00332	0.000	2.953	-0.000	1
23	-2.1000	-1.91245	0.03906	0.00011	0.00451	0.000	2.953	-0.001	1
24	-2.1000	-1.82872	0.03866	0.00027	0.00440	0.001	2.963	-0.008	1
25	-2.1000	-1.74588	0.03786	0.00041	0.00419	0.004	2.927	-0.019	1
26	-2.0000	-1.65524	0.03656	0.00054	0.00387	0.011	2.884	-0.034	1
27	-2.0000	-1.58817	0.03476	0.00109	0.00340	0.029	2.842	-0.054	1
28	-2.0000	-1.51522	0.03178	0.00153	0.00283	0.074	2.800	-0.091	1
29	-1.9000	-1.45139	0.02809	0.00175	0.00249	0.138	2.857	-0.114	1
30	-1.9000	-1.39336	0.02571	-0.00017	0.00451	0.008	3.157	-1.074	1
31	-1.8000	-1.33068	0.03819	-0.01000	0.01910	4.390	16.827	0.001	7
32	-1.8000	-1.17502	0.12089	-0.06083	0.05585	2.095	12.995	1.154	4
33	-0.9000	-0.79409	0.19455	0.02527	0.04994	0.097	3.822	-0.383	1
34	-0.8000	-0.69609	0.07436	0.00475	0.04188	4.008	1.310	-0.025	2
35	-0.7000	-0.59254	0.01044	0.00716	0.01112	1.815	6.935	-1.515	2
36	-0.6000	-0.53435	0.02659	-0.00109	0.00327	0.044	12.000	0.191	4
							4.829	0.010	7

(Success)

21	-2.0000	-1.90219	0.03449	-0.00255	0.00273	0.160	2.291	-0.068	1
22	-1.9000	-1.82232	0.03855	-0.00138	0.00410	0.042	2.758	-0.042	1
23	-1.8000	-1.73165	0.03841	-0.00081	0.00482	0.010	2.893	-0.020	1
24	-1.7000	-1.63630	0.03722	-0.00052	0.00525	0.004	2.944	-0.012	1
25	-1.6000	-1.55510	0.03574	-0.00035	0.00551	0.002	2.968	-0.013	1
26	-1.5000	-1.45825	0.03438	-0.00025	0.00571	0.001	2.980	-0.011	1
27	-1.4000	-1.35500	0.03324	-0.00018	0.00585	0.000	2.987	-0.011	1
28	-1.3000	-1.26891	0.03258	-0.00014	0.00594	0.000	2.991	-0.009	1
29	-1.2000	-1.17210	0.03196	-0.00010	0.00602	0.000	2.994	-0.007	1
30	-1.1000	-1.07600	0.03150	-0.00008	0.00608	0.000	2.996	-0.006	1
31	-1.0000	-0.97735	0.03119	-0.00006	0.00612	0.000	2.997	-0.005	1
32	-0.9000	-0.87645	0.03092	-0.00005	0.00615	0.000	2.998	-0.004	1
33	-0.8000	-0.78130	0.03062	-0.00004	0.00618	0.000	2.998	-0.003	1
34	-0.7000	-0.68296	0.03050	-0.00003	0.00621	0.000	2.999	-0.003	1
35	-0.6000	-0.58446	0.03038	-0.00002	0.00624	0.000	2.999	-0.002	1
36	-0.5000	-0.48583	0.03032	-0.00002	0.00625	0.000	2.999	-0.002	1
37	-0.4000	-0.38710	0.03026	-0.00002	0.00626	0.000	2.999	-0.001	1
38	-0.3000	-0.28829	0.03020	-0.00001	0.00627	0.000	2.999	-0.001	1
39	-0.2000	-0.18942	0.03014	-0.00001	0.00627	0.000	2.999	-0.001	1
40	-0.1000	-0.09049	0.03011	-0.00001	0.00628	0.000	2.999	-0.001	1
41	0.0000	0.00847	0.03008	-0.00000	0.00628	0.000	2.999	-0.000	1
42	0.1000	0.10755	0.03005	-0.00000	0.00628	0.000	2.999	-0.000	1
43	0.2000	0.20664	0.03002	-0.00000	0.00628	0.000	2.999	-0.000	1
44	0.3000	0.30563	0.03000	0.00000	0.00628	0.000	3.000	-0.000	1
45	0.4000	0.40462	0.02998	0.00000	0.00628	0.000	3.000	-0.000	1
46	0.5000	0.50358	0.02995	0.00001	0.00628	0.000	3.000	-0.000	1
47	0.6000	0.60252	0.02992	0.00001	0.00627	0.000	2.999	-0.000	1
48	0.7000	0.70137	0.02990	0.00001	0.00626	0.000	2.999	-0.001	1
49	0.8000	0.80006	0.02984	0.00001	0.00625	0.000	2.999	-0.001	1
50	0.9000	0.89863	0.02984	0.00002	0.00624	0.000	2.999	-0.001	1
51	1.0000	0.99751	0.02980	0.00002	0.00623	0.000	2.999	-0.002	1
52	1.1000	1.09612	0.02977	0.00003	0.00622	0.000	2.999	-0.002	1
53	1.2000	1.19460	0.02974	0.00003	0.00621	0.000	2.999	-0.002	1
54	1.3000	1.29296	0.02969	0.00004	0.00619	0.000	2.999	-0.003	1
55	1.4000	1.39110	0.02962	0.00004	0.00618	0.000	2.998	-0.003	1
56	1.5000	1.48906	0.02953	0.00005	0.00613	0.000	2.998	-0.004	1
57	1.6000	1.58676	0.02939	0.00007	0.00609	0.000	2.997	-0.005	1
58	1.7000	1.68414	0.02921	0.00008	0.00603	0.000	2.996	-0.006	1
59	1.8000	1.78113	0.02898	0.00011	0.00593	0.000	2.994	-0.008	1
60	1.9000	1.87762	0.02866	0.00014	0.00581	0.000	2.991	-0.009	1
61	2.0000	1.97345	0.02812	0.00014	0.00561	0.000	2.987	-0.011	1
62	2.1000	2.06847	0.02745	0.00015	0.00541	0.000	2.980	-0.013	1
63	2.2000	2.15220	0.02701	0.00015	0.00568	0.001	2.968	-0.017	2
64	2.3000	2.23437	0.02704	0.00012	0.00540	0.002	2.944	-0.022	2
65	2.4000	2.31375	0.02681	0.00081	0.00551	0.004	2.891	-0.030	2
66	2.5000	2.37964	0.01898	0.00117	0.00458	0.010	2.751	-0.041	2
67	2.6000	2.43814	0.01628	0.00259	0.00284	0.187	2.278	-0.060	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 4

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
16	-2.5000	-2.53342	0.03439	-0.00240	0.00279	0.141	2.352	-0.065	1
17	-2.4000	-2.43961	0.03824	-0.00128	0.00404	0.030	2.271	-0.041	1
18	-2.3000	-2.33776	0.04035	-0.00076	0.00477	0.009	2.491	-0.029	1
19	-2.2000	-2.23886	0.04168	-0.00033	0.00512	0.003	2.946	-0.021	1
20	-2.1000	-2.09378	0.04256	-0.00033	0.00538	0.001	2.969	-0.016	2
21	-2.0000	-2.00051	0.04317	-0.00024	0.00556	0.001	2.981	-0.013	3
22	-1.9000	-1.90062	0.04361	-0.00018	0.00568	0.000	2.988	-0.011	4
23	-1.8000	-1.80190	0.04394	-0.00014	0.00578	0.000	2.992	-0.010	4
24	-1.7000	-1.71155	0.04420	-0.00011	0.00585	0.000	2.995	-0.009	4
25	-1.6000	-1.62065	0.04442	-0.00009	0.00591	0.000	2.997	-0.008	4
26	-1.5000	-1.52436	0.04461	-0.00008	0.00597	0.000	2.998	-0.007	4
27	-1.4000	-1.42770	0.04478	-0.00006	0.00601	0.000	2.999	-0.007	4
28	-1.3000	-1.33065	0.04494	-0.00005	0.00606	0.000	3.000	-0.006	4
29	-1.2000	-1.23324	0.04512	-0.00004	0.00611	0.000	3.001	-0.005	4
30	-1.1000	-1.13544	0.04530	-0.00003	0.00616	0.000	3.001	0.004	4
31	-1.0000	-1.03721	0.04551	-0.00002	0.00622	0.000	3.002	0.003	4
32	-0.9000	-0.93852	0.04574	-0.00001	0.00628	0.000	3.002	0.002	4
33	-0.8000	-0.83934	0.04599	-0.00001	0.00635	0.000	3.003	0.001	4
34	-0.7000	-0.73950	0.04627	-0.00000	0.00642	0.000	3.002	0.001	4
35	-0.6000	-0.63910	0.04655	-0.00000	0.00650	0.000	3.001	0.000	4
36	-0.5000	-0.53810	0.04682	-0.00000	0.00657	0.000	2.999	-0.000	4
37	-0.4000	-0.43656	0.04705	-0.00000	0.00662	0.000	2.998	-0.001	4
38	-0.3000	-0.33460	0.04719	-0.00000	0.00665	0.000	2.997	-0.002	4
39	-0.2000	-0.23247	0.04721	0.00000	0.00665	0.000	2.998	-0.002	4
40	-0.1000	-0.13048	0.04709	0.00000	0.00665	0.000	2.998	-0.001	4
41	0.0000	-0.02904	0.04686	0.00001	0.00659	0.000	2.999	-0.000	4
42	0.1000	0.07121	0.04661	0.00002	0.00647	0.000	2.999	-0.000	4
43	0.2000	0.16973	0.04641	0.00003	0.00628	0.000	2.999	-0.000	4
44	0.3000	0.26584	0.04630	0.00004	0.00608	0.000	2.999	-0.000	4
45	0.4000	0.35785	0.04634	0.00005	0.00594	0.000	2.999	-0.000	4
46	0.5000	0.44379	0.04661	0.00006	0.00587	0.000	2.999	-0.000	4
47	0.6000	0.51969	0.04734	0.00007	0.00590	0.000	2.999	-0.000	4
48	0.7000	0.57815	0.04861	0.00007	0.00600	0.000	2.999	-0.000	4
49	0.8000	0.60791	0.05041	0.00007	0.00613	0.000	2.999	-0.000	4
50	0.9000	0.59656	0.05258	0.00007	0.00624	0.000	2.999	-0.000	4
51	1.0000	0.55509	0.05482	0.00007	0.00629	0.000	2.999	-0.000	4
52	1.1000	0.49349	0.05682	0.00007	0.00627	0.000	2.999	-0.000	4
53	1.2000	0.42177	0.05830	0.00007	0.00621	0.000	2.999	-0.000	4
54	1.3000	0.34993	0.05911	0.00007	0.00617	0.000	2.999	-0.000	4
55	1.4000	0.27798	0.05928	0.00007	0.00615	0.000	2.999	-0.000	4
56	1.5000	0.20592	0.05915	0.00007	0.00611	0.000	2.998	-0.000	4
57	1.6000	0.13376	0.05901	0.00007	0.00608	0.000	2.998	-0.000	4
58	1.7000	0.06150	0.05888	0.00008	0.00601	0.000	2.997	-0.000	4
59	1.8000	0.01077	0.05885	0.00008	0.00597	0.000	2.996	-0.000	4
60	1.9000	0.08124	0.05894	0.00009	0.00594	0.000	2.995	-0.000	4
61	2.0000	0.15304	0.05898	0.00009	0.00589	0.000	2.994	-0.000	4
62	2.1000	0.22487	0.05858	0.00009	0.00586	0.000	2.993	-0.000	4
63	2.2000	0.29671	0.05794	0.00009	0.00582	0.000	2.992	-0.000	4
64	2.3000	0.36861	0.05701	0.00009	0.00577	0.000	2.991	-0.000	4
65	2.4000	0.44057	0.05581	0.00009	0.00571	0.000	2.990	-0.000	4
66	2.5000	0.51260	0.05434	0.00009	0.00564	0.000	2.989	-0.000	4
(Success)									
23	-2.1000	-2.00685	0.03610	-0.00274	0.00282	0.186	2.228	-0.072	1
21	-2.0000	-1.92547	0.03861	-0.00144	0.00409	0.036	2.362	-0.044	1
22	-1.9000	-1.83912	0.04100	-0.00085	0.00485	0.013	2.483	-0.030	1
23	-1.8000	-1.74470	0.04247	-0.00054	0.00531	0.004	2.942	-0.022	2
24	-1.7000	-1.65531	0.04353	-0.00036	0.00561	0.002	2.967	-0.017	3
25	-1.6000	-1.56099	0.04409	-0.00026	0.00579	0.001	2.980	-0.013	4
26	-1.5000	-1.46506	0.04457	-0.00019	0.00593	0.000	2.987	-0.011	4
27	-1.4000	-1.36825	0.04491	-0.00014	0.00603	0.000	2.991	-0.008	4
28	-1.3000	-1.27079	0.04517	-0.00010	0.00611	0.000	2.993	-0.007	4
29	-1.2000	-1.17284	0.04537	-0.00008	0.00617	0.000	2.995	-0.005	4
30	-1.1000	-1.07452	0.04552	-0.00006	0.00621	0.000	2.996	-0.004	4
31	-1.0000	-0.97592	0.04563	-0.00005	0.00624	0.000	2.997	-0.003	4
32	-0.9000	-0.87710	0.04572	-0.00004	0.00627	0.000	2.998	-0.002	4
33	-0.8000	-0.77812	0.04578	-0.00003	0.00629	0.000	2.998	-0.001	4
34	-0.7000	-0.67902	0.04583	-0.00002	0.00630	0.000	2.998	-0.001	4
35	-0.6000	-0.57984	0.04586	-0.00001	0.00631	0.000	2.999	-0.000	4
36	-0.5000	-0.48061	0.04588	-0.00001	0.00631	0.000	2.999	-0.000	4
37	-0.4000	-0.38133	0.04589	-0.00000	0.00632	0.000	2.999	-0.000	4
38	-0.3000	-0.28205	0.04590	-0.00000	0.00632	0.000	2.999	-0.000	4
39	-0.2000	-0.18276	0.04589	0.00000	0.00632	0.000	2.999	-0.000	4
40	-0.1000	-0.08348	0.04589	0.00001	0.00632	0.000	2.999	-0.000	4
41	0.0000	0.01577	0.04587	0.00001	0.00632	0.000	2.999	-0.000	4
42	0.1000	0.11499	0.04586	0.00001	0.00631	0.000	3.000	-0.000	4
43	0.2000	0.21417	0.04583	0.00001	0.00631	0.000	3.000	-0.000	4
44	0.3000	0.31330	0.04581	0.00001	0.00630	0.000	3.000	-0.001	4
45	0.4000	0.41236	0.04578	0.00001	0.00629	0.000	3.000	-0.001	4
46	0.5000	0.51137	0.04575	0.00001	0.00629	0.000	3.000	-0.002	4
47	0.6000	0.61030	0.04571	0.00001	0.00628	0.000	3.000	-0.002	4
48	0.7000	0.70915	0.04567	0.00002	0.00627	0.000	3.000	-0.002	4
49	0.8000	0.80791	0.04561	0.00002	0.00626	0.000	2.999	-0.003	4
50	0.9000	0.90656	0.04554	0.00001	0.00624	0.000	2.999	-0.003	4
51	1.0000	1.00509	0.04552	0.00001	0.00623	0.000	2.999	-0.003	4
52	1.1000	1.10349	0.04545	0.00001	0.00621	0.000	2.999	-0.004	4
53	1.2000	1.20175	0.04537	0.00001	0.00619	0.000	2.999	-0.004	4
54	1.3000	1.29977	0.04528	0.00004	0.00617	0.000	2.999	-0.004	4
55	1.4000	1.39760	0.04518	0.00005	0.00615	0.000	2.998	-0.004	4
56	1.5000	1.49518	0.04503	0.00005	0.00611	0.000	2.998	-0.004	4
57	1.6000	1.59246	0.04488	0.00007	0.00608	0.000	2.998	-0.005	4
58	1.7000	1.68924	0.04465	0.00009	0.00601	0.000	2.997	-0.006	4
59	1.8000	1.78557	0.04439	0.00011	0.00597	0.000	2.996	-0.007	4
60	1.9000	1.88124	0.04404	0.00014	0.00589	0.000	2.994	-0.008	4
61	2.0000	1.97604	0.04358	0.00015	0.00579	0.000	2.991	-0.009	4
62	2.1000	2.06967	0.04294	0.00025	0.00566	0.001	2.987	-0.011	4
63	2.2000	2.16161	0.04201	0.00035	0.00547	0.002	2.983	-0.014	4
64	2.3000	2.25139	0.04063	0.00051	0.00519	0.004	2.968	-0.017	2
65	2.4000	2.33867	0.03841	0.00081	0.00477	0.010	2.944	-0.022	2
66	2.5000	2.41560	0.03423	0.00155	0.00404	0.033	2.891	-0.030	1
					0.00287	0.166	2.753	-0.043	1
					0.00150	0.540	2.283	-0.069	1
							1.505	-0.135	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 5

Subject	$\hat{\theta}$	Mean	Conditional Moments Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.67066	0.02940	-0.00408	0.00105	0.649	1.209	-0.180	1
16	-2.5000	-2.61942	0.03564	-0.00196	0.00322	0.085	2.536	-0.356	1
17	-2.4000	-2.33954	0.03882	-0.00109	0.00425	0.020	2.820	-0.036	1
18	-2.3000	-2.25241	0.04066	-0.00066	0.00482	0.006	2.914	-0.025	1
19	-2.2000	-2.16312	0.04181	-0.00043	0.00516	0.002	2.953	-0.019	1
20	-2.1000	-2.07180	0.04257	-0.00029	0.00539	0.001	2.972	-0.014	2
21	-2.0000	-1.97912	0.04309	-0.00020	0.00554	0.000	2.982	-0.010	2
22	-1.9000	-1.88549	0.04345	-0.00014	0.00564	0.000	2.988	-0.007	2
23	-1.8000	-1.79122	0.04370	-0.00010	0.00571	0.000	2.991	-0.005	2
24	-1.7000	-1.69668	0.04387	-0.00007	0.00576	0.000	2.993	-0.003	2
25	-1.6000	-1.60143	0.04399	-0.00004	0.00579	0.000	2.995	-0.001	2
26	-1.5000	-1.50619	0.04406	-0.00002	0.00581	0.000	2.996	-0.000	2
27	-1.4000	-1.41085	0.04408	-0.00000	0.00582	0.000	2.996	-0.000	2
28	-1.3000	-1.31549	0.04408	0.00001	0.00582	0.000	2.997	-0.000	2
29	-1.2000	-1.22016	0.04404	0.00002	0.00581	0.000	2.997	-0.001	2
30	-1.1000	-1.12495	0.04398	0.00003	0.00580	0.000	2.997	-0.002	2
31	-1.0000	-1.02990	0.04389	0.00005	0.00578	0.000	2.998	-0.004	2
32	-0.9000	-0.93520	0.04379	0.00005	0.00575	0.000	2.999	-0.004	2
33	-0.8000	-0.84047	0.04367	0.00006	0.00572	0.000	3.000	-0.052	4
34	-0.7000	-0.74612	0.04355	0.00305	0.00573	0.001	3.004	0.003	8
35	-0.6000	-0.65200	0.04347	0.00002	0.00569	0.000	3.010	0.000	8
36	-0.5000	-0.55797	0.04348	-0.00004	0.00571	0.000	3.021	0.330	9
37	-0.4000	-0.46374	0.04368	-0.00016	0.00580	0.000	3.041	0.003	7
38	-0.3000	-0.36871	0.04425	-0.00039	0.00602	0.002	3.072	0.010	7
39	-0.2000	-0.27178	0.04553	-0.00083	0.00645	0.007	3.115	0.324	7
40	-0.1000	-0.17104	0.04787	-0.00143	0.00721	0.019	3.148	0.058	4
41	0.0000	-0.06256	0.05178	-0.00219	0.00837	0.034	3.124	0.181	4
42	0.1000	0.05404	0.05711	-0.00263	0.00979	0.037	3.002	-0.262	1
43	0.2000	0.18350	0.06233	-0.00196	0.01100	0.016	2.832	-0.331	1
44	0.3000	0.32158	0.06661	-0.00000	0.01148	0.000	2.750	-0.000	2
45	0.4000	0.45966	0.06234	0.00195	0.01101	0.016	2.833	-0.031	1
46	0.5000	0.58915	0.05714	0.00262	0.00980	0.037	3.003	-0.267	1
(Success)									
28	-1.3000	-1.18346	0.03379	-0.00275	0.00250	0.197	2.192	-0.373	1
29	-1.2000	-1.10516	0.03812	-0.00144	0.00397	0.031	2.732	-0.044	1
30	-1.1000	-1.01989	0.04050	-0.00084	0.00473	0.011	2.883	-0.030	1
31	-1.0000	-1.93359	0.04195	-0.00053	0.00517	0.004	2.941	-0.022	2
32	-0.9000	-0.83435	0.04289	-0.00036	0.00546	0.002	2.966	-0.017	2
33	-0.8000	-0.74522	0.04354	-0.00025	0.00565	0.001	2.979	-0.013	2
34	-0.7000	-0.65651	0.04399	-0.00018	0.00578	0.000	2.987	-0.010	2
35	-0.6000	-0.55896	0.04433	-0.00013	0.00588	0.000	2.991	-0.008	2
36	-0.5000	-0.45878	0.04458	-0.00010	0.00595	0.000	2.994	-0.007	2
37	-0.4000	-0.36212	0.04477	-0.00008	0.00600	0.000	2.995	-0.005	2
38	-0.3000	-0.26529	0.04492	-0.00006	0.00605	0.000	2.997	-0.004	2
39	-0.2000	-0.16778	0.04504	-0.00005	0.00608	0.000	2.997	-0.003	2
40	-0.1000	-0.07025	0.04513	-0.00004	0.00611	0.000	2.998	-0.003	2
41	0.0000	0.02745	0.04520	-0.00003	0.00613	0.000	2.998	-0.002	2
42	0.1000	0.12521	0.04525	-0.00002	0.00614	0.000	2.999	-0.001	2
43	0.2000	0.22324	0.04530	-0.00002	0.00615	0.000	2.999	-0.001	2
44	0.3000	0.32126	0.04533	-0.00001	0.00616	0.000	2.999	-0.001	2
45	0.4000	0.41934	0.04535	-0.00001	0.00617	0.000	2.999	-0.000	2
46	0.5000	0.51749	0.04536	-0.00000	0.00617	0.000	2.999	-0.000	2
47	0.6000	0.61557	0.04536	0.00001	0.00617	0.000	2.999	-0.000	2
48	0.7000	0.71365	0.04535	0.00001	0.00617	0.000	2.999	-0.000	2
49	0.8000	0.81178	0.04533	0.00001	0.00616	0.000	2.999	-0.000	2
50	0.9000	0.90983	0.04531	0.00001	0.00616	0.000	2.999	-0.000	2
51	1.0000	1.00781	0.04527	0.00002	0.00615	0.000	2.999	-0.001	2
52	1.1000	1.10573	0.04522	0.00003	0.00613	0.000	2.999	-0.001	2
53	1.2000	1.20367	0.04516	0.00004	0.00612	0.000	2.999	-0.002	2
54	1.3000	1.30177	0.04508	0.00004	0.00609	0.000	2.998	-0.002	2
55	1.4000	1.39952	0.04498	0.00005	0.00606	0.000	2.998	-0.003	2
56	1.5000	1.49570	0.04486	0.00007	0.00601	0.000	2.997	-0.004	2
57	1.6000	1.59251	0.04469	0.00008	0.00598	0.000	2.996	-0.005	2
58	1.7000	1.68904	0.04448	0.00011	0.00592	0.000	2.995	-0.007	2
59	1.8000	1.78499	0.04421	0.00014	0.00585	0.000	2.993	-0.007	2
60	1.9000	1.88026	0.04389	0.00019	0.00574	0.000	2.990	-0.009	2
61	2.0000	1.97481	0.04345	0.00027	0.00560	0.001	2.986	-0.011	2
62	2.1000	2.06770	0.04288	0.00038	0.00539	0.003	2.979	-0.014	2
63	2.2000	2.15895	0.04164	0.00059	0.00539	0.005	2.961	-0.018	2
64	2.3000	2.24745	0.04006	0.00092	0.00460	0.013	2.914	-0.026	2
65	2.4000	2.33152	0.03743	0.00159	0.00376	0.048	2.867	-0.032	1
66	2.5000	2.43781	0.03257	0.00312	0.00209	0.282	1.974	-0.085	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 6

Subject (Failure)	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
15	-2.6000	-2.58834	0.02471	-0.00415	0.00106	0.658	1.197	-0.184	1
16	-2.5000	-2.52566	0.03598	-0.00700	0.00328	0.086	2.536	-0.056	1
17	-2.4000	-2.34627	0.03921	-0.00111	0.00434	0.020	2.822	-0.037	1
18	-2.3000	-2.25774	0.04109	-0.00068	0.00492	0.007	2.916	-0.026	1
19	-2.2000	-2.16767	0.04229	-0.00046	0.00528	0.001	2.954	-0.020	2
20	-2.1000	-2.07511	0.04307	-0.00030	0.00551	0.001	2.973	-0.015	2
21	-2.0000	-1.98130	0.04362	-0.00022	0.00568	0.001	2.983	-0.012	8
22	-1.9000	-1.88668	0.04402	-0.00015	0.00579	0.000	2.989	-0.009	8
23	-1.8000	-1.79091	0.04432	-0.00012	0.00588	0.000	2.992	-0.008	8
24	-1.7000	-1.69478	0.04454	-0.00009	0.00594	0.000	2.994	-0.006	8
25	-1.6000	-1.59822	0.04472	-0.00007	0.00599	0.000	2.996	-0.005	8
26	-1.5000	-1.50133	0.04485	-0.00005	0.00603	0.000	2.997	-0.004	8
27	-1.4000	-1.40418	0.04496	-0.00005	0.00606	0.000	2.998	-0.003	8
28	-1.3000	-1.30684	0.04504	-0.00003	0.00608	0.000	2.998	-0.002	8
29	-1.2000	-1.20933	0.04510	-0.00003	0.00610	0.000	2.998	-0.002	8
30	-1.1000	-1.11171	0.04515	-0.00002	0.00611	0.000	2.999	-0.001	8
31	-1.0000	-1.01400	0.04518	-0.00001	0.00612	0.000	2.999	-0.001	8
32	-0.9000	-0.91621	0.04521	-0.00001	0.00613	0.000	2.999	-0.000	8
33	-0.8000	-0.81842	0.04522	-0.00000	0.00613	0.000	2.999	-0.000	8
34	-0.7000	-0.72059	0.04523	-0.00000	0.00613	0.000	2.999	-0.000	8
35	-0.6000	-0.62274	0.04522	-0.00000	0.00613	0.000	2.999	-0.000	8
36	-0.5000	-0.52492	0.04521	0.00001	0.00613	0.000	2.999	-0.000	8
37	-0.4000	-0.42712	0.04520	0.00001	0.00613	0.000	2.999	-0.001	8
38	-0.3000	-0.32938	0.04517	0.00001	0.00612	0.000	2.999	-0.001	8
39	-0.2000	-0.23169	0.04514	0.00002	0.00611	0.000	2.999	-0.001	8
40	-0.1000	-0.13409	0.04510	0.00002	0.00610	0.000	2.999	-0.002	8
41	0.0000	-0.01654	0.04505	0.00002	0.00609	0.000	2.999	-0.003	8
42	0.1000	0.08082	0.04499	0.00003	0.00607	0.000	2.999	-0.003	8
43	0.2000	0.17808	0.04493	0.00003	0.00605	0.000	2.999	-0.004	8
44	0.3000	0.27519	0.04485	0.00004	0.00603	0.000	2.999	-0.005	8
45	0.4000	0.37213	0.04477	0.00004	0.00601	0.000	2.999	-0.007	8
46	0.5000	0.46887	0.04467	0.00005	0.00598	0.000	2.999	-0.009	8
47	0.6000	0.56540	0.04457	0.00005	0.00596	0.000	2.999	-0.011	8
48	0.7000	0.66169	0.04446	0.00005	0.00593	0.000	3.000	-0.013	1
49	0.8000	0.75775	0.04435	0.00005	0.00590	0.000	3.001	0.017	8
50	0.9000	0.85358	0.04424	0.00004	0.00588	0.000	3.002	0.004	8
51	1.0000	0.92920	0.04416	0.00003	0.00586	0.000	3.005	0.001	8
52	1.1000	1.02469	0.04413	-0.00000	0.00586	0.000	3.011	0.000	8
53	1.2000	1.12027	0.04420	-0.00007	0.00590	0.000	3.020	0.001	8
54	1.3000	1.21616	0.04446	-0.00018	0.00600	0.000	3.034	0.004	7
55	1.4000	1.31286	0.04504	-0.00037	0.00620	0.001	3.054	0.011	7
56	1.5000	1.41140	0.04614	-0.00067	0.00655	0.005	3.078	0.024	7
57	1.6000	1.51311	0.04801	-0.00108	0.00713	0.010	3.092	0.052	4
58	1.7000	1.61990	0.05084	-0.00153	0.00794	0.018	3.073	0.145	4
59	1.8000	1.73339	0.05449	-0.00177	0.00891	0.019	3.002	-0.271	1
60	1.9000	1.85525	0.05809	-0.00143	0.00979	0.010	2.900	-0.034	1
61	2.0000	1.98407	0.06012	-0.00016	0.01024	0.001	2.833	-0.001	2
62	2.1000	2.11395	0.05947	0.00092	0.01009	0.004	2.854	-0.010	2
63	2.2000	2.23968	0.05851	0.00168	0.00940	0.016	2.965	-0.035	1
64	2.3000	2.35778	0.05271	0.00172	0.00844	0.020	3.039	0.890	4
65	2.4000	2.48796	0.34935	0.00134	0.00752	0.015	3.086	0.090	4
66	2.5000	2.57387	0.04694	0.00090	0.00680	0.008	3.087	0.039	4
67	2.6000	2.67154	0.34341	0.00054	0.00632	0.003	3.067	0.019	7

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 6 (Continued)

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Success)									
21	-2.0000	-1.99126	0.02351	-0.00506	0.00053	0.971	0.674	1.559	6
22	-1.9000	-1.81516	0.03706	-0.00237	0.00339	0.110	2.466	-0.062	1
23	-1.8000	-1.73155	0.05085	-0.00129	0.00468	0.024	2.401	-0.030	1
24	-1.7000	-1.63051	0.04302	-0.00076	0.00519	0.007	2.905	-0.015	1
25	-1.6000	-1.54592	0.04432	-0.00041	0.00579	0.001	2.967	-0.017	2
26	-1.5000	-1.44504	0.04511	-0.00029	0.00604	0.001	2.967	-0.010	2
27	-1.4000	-1.35037	0.04562	-0.00017	0.00620	0.000	2.978	-0.005	4
28	-1.3000	-1.25135	0.04590	-0.00009	0.00629	0.000	2.986	-0.002	4
29	-1.2000	-1.15234	0.04601	-0.00004	0.00634	0.000	2.990	-0.001	4
30	-1.1000	-1.05234	0.04607	-0.00000	0.00635	0.000	2.994	-0.000	4
31	-1.0000	-0.95139	0.04605	0.00002	0.00635	0.000	2.996	-0.000	4
32	-0.9000	-0.85051	0.04599	0.00003	0.00634	0.000	2.998	-0.002	4
33	-0.8000	-0.75013	0.04591	0.00004	0.00632	0.000	2.999	-0.003	4
34	-0.7000	-0.65004	0.04583	0.00004	0.00630	0.000	3.000	0.004	4
35	-0.6000	-0.55002	0.04575	0.00004	0.00628	0.000	3.001	0.007	4
36	-0.5000	-0.45002	0.04568	0.00003	0.00626	0.000	3.001	0.004	4
37	-0.4000	-0.35001	0.04562	0.00003	0.00624	0.000	3.001	0.003	4
38	-0.3000	-0.25001	0.04556	0.00002	0.00623	0.000	3.001	0.002	4
39	-0.2000	-0.15001	0.04552	0.00002	0.00622	0.000	3.001	0.002	4
40	-0.1000	-0.05000	0.04549	0.00002	0.00621	0.000	3.001	0.002	4
41	0.0000	0.04999	0.04545	0.00001	0.00620	0.000	3.000	0.002	4
42	0.1000	0.14999	0.04542	0.00001	0.00619	0.000	3.000	0.002	4
43	0.2000	0.24998	0.04540	0.00001	0.00618	0.000	3.000	0.002	4
44	0.3000	0.34998	0.04537	0.00001	0.00618	0.000	3.000	0.001	4
45	0.4000	0.44998	0.04535	0.00001	0.00617	0.000	3.000	-0.005	4
46	0.5000	0.54998	0.04533	0.00001	0.00616	0.000	3.000	-0.002	4
47	0.6000	0.64997	0.04531	0.00001	0.00616	0.000	3.000	-0.002	4
48	0.7000	0.74997	0.04528	0.00001	0.00615	0.000	3.000	-0.002	4
49	0.8000	0.84996	0.04525	0.00002	0.00614	0.000	2.999	-0.002	4
50	0.9000	0.94996	0.04521	0.00002	0.00613	0.000	2.999	-0.002	4
51	1.0000	1.04995	0.04516	0.00002	0.00612	0.000	2.999	-0.002	4
52	1.1000	1.14995	0.04510	0.00003	0.00610	0.000	2.999	-0.002	4
53	1.2000	1.24995	0.04504	0.00004	0.00608	0.000	2.998	-0.003	4
54	1.3000	1.34994	0.04495	0.00004	0.00606	0.000	2.998	-0.004	4
55	1.4000	1.44994	0.04484	0.00006	0.00603	0.000	2.997	-0.004	4
56	1.5000	1.54994	0.04470	0.00007	0.00599	0.000	2.996	-0.005	4
57	1.6000	1.64993	0.04453	0.00009	0.00594	0.000	2.995	-0.006	4
58	1.7000	1.74993	0.04431	0.00012	0.00587	0.000	2.992	-0.008	4
59	1.8000	1.84993	0.04402	0.00016	0.00579	0.000	2.989	-0.009	4
60	1.9000	1.94968	0.04362	0.00021	0.00568	0.001	2.984	-0.012	4
61	2.0000	2.04950	0.04308	0.00029	0.00552	0.001	2.974	-0.015	2
62	2.1000	2.07192	0.04211	0.00041	0.00529	0.002	2.956	-0.019	2
63	2.2000	2.18210	0.04117	0.00065	0.00495	0.006	2.920	-0.026	1
64	2.3000	2.24956	0.03936	0.00106	0.00439	0.019	2.832	-0.036	1
65	2.4000	2.31170	0.03627	0.00160	0.00358	0.036	2.573	-0.054	1
66	2.5000	2.40452	0.03034	0.00190	0.00230	0.594	1.410	-0.137	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 7

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.49877	0.03284	-0.00299	0.00221	0.252	2.268	-0.081	1
16	-2.5000	-2.42210	0.03751	-0.00154	0.00380	0.045	2.698	-0.046	1
17	-2.4000	-2.33295	0.04005	-0.00089	0.00461	0.012	2.872	-0.032	1
18	-2.3000	-2.24952	0.04158	-0.00056	0.00508	0.004	2.935	-0.023	2
19	-2.2000	-2.15841	0.04258	-0.00037	0.00537	0.002	2.964	-0.017	2
20	-2.1000	-2.06551	0.04326	-0.00026	0.00557	0.001	2.978	-0.014	8
21	-2.0000	-1.97138	0.04374	-0.00019	0.00571	0.000	2.986	-0.011	8
22	-1.9000	-1.87636	0.04409	-0.00014	0.00581	0.000	2.990	-0.009	8
23	-1.8000	-1.78068	0.04435	-0.00011	0.00589	0.000	2.993	-0.007	8
24	-1.7000	-1.68450	0.04455	-0.00008	0.00594	0.000	2.995	-0.005	8
25	-1.6000	-1.58795	0.04471	-0.00006	0.00599	0.000	2.996	-0.004	8
26	-1.5000	-1.49111	0.04482	-0.00005	0.00602	0.000	2.997	-0.003	8
27	-1.4000	-1.39404	0.04491	-0.00004	0.00605	0.000	2.998	-0.002	8
28	-1.3000	-1.29683	0.04498	-0.00003	0.00607	0.000	2.998	-0.002	8
29	-1.2000	-1.19943	0.04503	-0.00002	0.00608	0.000	2.998	-0.001	8
30	-1.1000	-1.10197	0.04507	-0.00001	0.00609	0.000	2.999	-0.000	8
31	-1.0000	-1.00445	0.04509	-0.00001	0.00610	0.000	2.999	-0.000	8
32	-0.9000	-0.90690	0.04510	-0.00000	0.00610	0.000	2.999	-0.000	8
33	-0.8000	-0.80934	0.04510	0.00000	0.00610	0.000	2.999	-0.000	8
34	-0.7000	-0.71180	0.04508	0.00001	0.00610	0.000	2.999	-0.000	8
35	-0.6000	-0.61429	0.04506	0.00001	0.00609	0.000	2.999	-0.001	8
36	-0.5000	-0.51684	0.04503	0.00002	0.00608	0.000	2.999	-0.001	8
37	-0.4000	-0.41947	0.04498	0.00002	0.00607	0.000	2.999	-0.002	8
38	-0.3000	-0.32221	0.04493	0.00003	0.00605	0.000	2.999	-0.002	8
39	-0.2000	-0.22509	0.04486	0.00003	0.00603	0.000	2.999	-0.003	8
40	-0.1000	-0.12812	0.04478	0.00004	0.00601	0.000	2.998	-0.004	8
41	0.0000	-0.03134	0.04468	0.00005	0.00599	0.000	2.998	-0.005	8
42	0.1000	0.06521	0.04457	0.00006	0.00596	0.000	2.998	-0.007	8
43	0.2000	0.16149	0.04444	0.00006	0.00592	0.000	2.998	-0.009	8
44	0.3000	0.25748	0.04430	0.00007	0.00588	0.000	2.998	-0.011	8
45	0.4000	0.35313	0.04413	0.00008	0.00584	0.000	2.998	-0.016	8
46	0.5000	0.44841	0.04395	0.00009	0.00579	0.000	2.999	-0.034	1
47	0.6000	0.54328	0.04376	0.00009	0.00575	0.000	3.001	0.031	4
48	0.7000	0.63776	0.04359	0.00007	0.00571	0.000	3.005	0.005	8
49	0.8000	0.73190	0.04346	0.00004	0.00569	0.000	3.014	0.000	8
50	0.9000	0.82590	0.04347	-0.00005	0.00573	0.000	3.030	0.000	7
51	1.0000	0.92017	0.04375	-0.00023	0.00586	0.001	3.060	0.004	7
52	1.1000	1.01560	0.04459	-0.00068	0.00618	0.004	3.106	0.014	7
53	1.2000	1.11381	0.04643	-0.00118	0.00682	0.014	3.162	0.037	4
54	1.3000	1.21766	0.04589	-0.00206	0.00792	0.034	3.182	0.099	4
55	1.4000	1.33117	0.05537	-0.00294	0.00948	0.051	3.094	1.134	6
56	1.5000	1.45810	0.06197	-0.00290	0.01110	0.035	2.892	-0.083	1
57	1.6000	1.59785	0.06656	-0.00105	0.01207	0.004	2.725	-0.005	2
58	1.7000	1.74214	0.06585	0.00165	0.01193	0.010	2.752	-0.014	2
(Success)									
34	-0.7000	-0.87813	0.04365	-0.00290	0.00727	0.101	3.814	0.059	4
35	-0.6000	-0.77373	0.05459	-0.00765	0.01165	0.360	3.910	0.398	4
36	-0.5000	-0.63346	0.07679	-0.01195	0.01772	0.316	3.007	-0.275	1
37	-0.4000	-0.54257	0.04651	-0.00338	0.02044	0.013	2.194	-0.006	2
38	-0.3000	-0.23859	0.06684	0.01064	0.01941	0.173	2.574	-1.100	1
39	-0.2000	-0.07169	0.06225	0.01000	0.01413	0.414	3.645	7.151	6
40	-0.1000	0.03805	0.04677	0.00450	0.00865	0.198	3.956	0.119	4
41	0.0000	0.13166	0.04093	0.00136	0.00592	0.027	3.541	0.020	7
42	0.1000	0.21818	0.03652	0.00013	0.00500	0.000	3.200	0.001	7
43	0.2000	0.30378	0.03975	-0.00226	0.00482	0.001	3.054	0.008	7
44	0.3000	0.39046	0.04042	-0.00036	0.00491	0.002	3.004	0.635	4
45	0.4000	0.47869	0.04114	-0.00032	0.00506	0.001	2.989	-0.043	1
46	0.5000	0.56840	0.04179	-0.00027	0.00522	0.001	2.987	-0.026	1
47	0.6000	0.65940	0.04232	-0.00022	0.00535	0.001	2.988	-0.019	8
48	0.7000	0.75145	0.04276	-0.00018	0.00547	0.000	2.990	-0.014	8
49	0.8000	0.84436	0.04311	-0.00014	0.00556	0.000	2.991	-0.011	8
50	0.9000	0.93793	0.04339	-0.00011	0.00563	0.000	2.993	-0.008	8
51	1.0000	1.03203	0.04360	-0.00008	0.00569	0.000	2.994	-0.006	8
52	1.1000	1.12652	0.04376	-0.00006	0.00573	0.000	2.995	-0.003	8
53	1.2000	1.22131	0.04386	-0.00004	0.00576	0.000	2.995	-0.001	8
54	1.3000	1.31628	0.04393	-0.00002	0.00578	0.000	2.995	-0.000	8
55	1.4000	1.41134	0.04395	0.00000	0.00578	0.000	2.995	-0.000	8
56	1.5000	1.51643	0.04392	0.00002	0.00578	0.000	2.994	-0.000	8
57	1.6000	1.60134	0.04385	0.00005	0.00575	0.000	2.993	-0.002	8
58	1.7000	1.69606	0.04371	0.00008	0.00572	0.000	2.992	-0.003	8
59	1.8000	1.79041	0.04350	0.00012	0.00565	0.000	2.989	-0.006	8
60	1.9000	1.88419	0.04318	0.00017	0.00556	0.000	2.984	-0.008	8
61	2.0000	1.97715	0.04273	0.00023	0.00543	0.001	2.975	-0.012	8
62	2.1000	2.06890	0.04206	0.00028	0.00523	0.002	2.960	-0.017	2
63	2.2000	2.15886	0.04114	0.00038	0.00493	0.005	2.928	-0.023	2
64	2.3000	2.24606	0.03944	0.00094	0.00444	0.014	2.855	-0.033	1
65	2.4000	2.32873	0.03673	0.00165	0.00358	0.055	2.651	-0.049	1
66	2.5000	2.40335	0.03166	0.00328	0.00184	0.340	1.834	-0.094	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 8

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.[illegible]	0.03052	-0.00188	0.00134	0.528	1.[illegible]	-0.133	1
16	-2.5000	-2.[illegible]	0.03042	-0.00189	0.00342	0.076	2.579	-0.054	1
17	-2.4000	-2.36063	0.03050	-0.00186	0.00442	0.018	2.814	-0.036	1
18	-2.3000	-2.25306	0.04131	-0.00065	0.00498	0.006	2.921	-0.026	1
19	-2.2000	-2.16237	0.04245	-0.00043	0.00533	0.002	2.957	-0.019	2
20	-2.1000	-2.08704	0.04323	-0.00030	0.00556	0.001	2.976	-0.015	2
21	-2.0000	-1.97550	0.04377	-0.00021	0.00572	0.001	2.986	-0.012	8
22	-1.9000	-1.88036	0.04417	-0.00016	0.00583	0.000	2.989	-0.010	8
23	-1.8000	-1.78566	0.04447	-0.00012	0.00592	0.000	2.993	-0.008	8
24	-1.7000	-1.68801	0.04470	-0.00009	0.00598	0.000	2.995	-0.007	8
25	-1.6000	-1.59111	0.04488	-0.00007	0.00603	0.000	2.996	-0.006	8
26	-1.5000	-1.49337	0.04502	-0.00006	0.00607	0.000	2.997	-0.005	8
27	-1.4000	-1.39535	0.04513	-0.00005	0.00611	0.000	2.998	-0.004	8
28	-1.3000	-1.29861	0.04521	-0.00004	0.00613	0.000	2.998	-0.003	8
29	-1.2000	-1.20068	0.04530	-0.00003	0.00615	0.000	2.999	-0.003	8
30	-1.1000	-1.10261	0.04536	-0.00003	0.00617	0.000	2.999	-0.002	8
31	-1.0000	-1.00462	0.04542	-0.00002	0.00619	0.000	2.999	-0.002	8
32	-0.9000	-0.90612	0.04546	-0.00002	0.00620	0.000	2.999	-0.002	8
33	-0.8000	-0.80774	0.04549	-0.00001	0.00621	0.000	2.999	-0.001	8
34	-0.7000	-0.70939	0.04552	-0.00001	0.00622	0.000	2.999	-0.001	8
35	-0.6000	-0.61074	0.04555	-0.00001	0.00622	0.000	3.000	-0.001	8
36	-0.5000	-0.51222	0.04557	-0.00001	0.00623	0.000	3.000	-0.001	8
37	-0.4000	-0.41362	0.04559	-0.00001	0.00623	0.000	3.000	-0.001	8
38	-0.3000	-0.31459	0.04560	-0.00001	0.00624	0.000	3.000	-0.001	8
39	-0.2000	-0.21633	0.04561	-0.00001	0.00624	0.000	3.000	-0.001	8
40	-0.1000	-0.11755	0.04562	-0.00000	0.00624	0.000	3.000	-0.001	8
41	0.0000	-0.01844	0.04563	-0.00000	0.00625	0.000	3.000	-0.002	8
42	0.1000	0.08079	0.04564	-0.00000	0.00625	0.000	3.000	0.001	8
43	0.2000	0.17983	0.04565	-0.00000	0.00625	0.000	3.000	0.001	8
44	0.3000	0.27930	0.04566	-0.00001	0.00626	0.000	3.000	0.001	8
45	0.4000	0.37810	0.04567	-0.00001	0.00626	0.000	3.000	0.001	8
46	0.5000	0.47692	0.04569	-0.00001	0.00626	0.000	3.000	0.001	8
47	0.6000	0.57578	0.04571	-0.00001	0.00627	0.000	3.001	0.001	8
48	0.7000	0.67470	0.04574	-0.00001	0.00628	0.000	3.001	0.001	8
49	0.8000	0.77368	0.04577	-0.00002	0.00629	0.000	3.001	0.001	8
50	0.9000	0.87274	0.04582	-0.00002	0.00630	0.000	3.001	0.002	8
51	1.0000	0.96992	0.04587	-0.00003	0.00632	0.000	3.002	0.002	8
52	1.1000	1.06934	0.04595	-0.00004	0.00634	0.000	3.002	0.003	8
53	1.2000	1.16874	0.04604	-0.00005	0.00637	0.000	3.002	0.004	8
54	1.3000	1.26847	0.04617	-0.00006	0.00640	0.000	3.003	0.005	8
55	1.4000	1.36850	0.04631	-0.00008	0.00644	0.000	3.003	0.007	8
56	1.5000	1.46888	0.04649	-0.00009	0.00649	0.000	3.003	0.009	8
57	1.6000	1.56968	0.04671	-0.00011	0.00655	0.000	3.003	0.011	8
58	1.7000	1.67099	0.04698	-0.00012	0.00662	0.000	3.003	0.015	8
59	1.8000	1.77288	0.04729	-0.00014	0.00670	0.000	3.001	0.019	8
60	1.9000	1.87541	0.04765	-0.00015	0.00679	0.000	3.001	0.024	8
61	2.0000	1.97861	0.04787	-0.00015	0.00687	0.000	2.999	-0.006	1
62	2.1000	2.08249	0.04817	-0.00014	0.00696	0.000	2.997	-0.019	8
63	2.2000	2.18701	0.04845	-0.00012	0.00703	0.000	2.995	-0.008	8
(Success)									
36	-0.5000	-0.57a11	0.05124	-0.00130	0.00798	0.012	3.041	0.212	6
37	-0.4000	-0.48411	0.05419	-0.00138	0.00876	0.012	2.982	-0.125	1
38	-0.3000	-0.38344	0.05686	-0.00101	0.00941	0.008	2.910	-0.021	2
39	-0.2000	-0.27905	0.05821	-0.00018	0.00972	0.000	2.869	-0.000	2
40	-0.1000	-0.07367	0.05756	0.00075	0.00957	0.003	2.888	-0.009	2
41	0.0000	0.03077	0.05524	0.00131	0.00901	0.010	2.954	-0.063	1
42	0.1000	0.14506	0.05225	0.00138	0.00825	0.011	3.022	-0.382	6
43	0.2000	0.25503	0.04950	0.00113	0.00750	0.011	3.060	0.090	6
44	0.3000	0.36371	0.04760	0.00080	0.00689	0.008	3.066	0.040	6
45	0.4000	0.46862	0.04599	0.00052	0.00646	0.005	3.055	0.020	7
46	0.5000	0.57038	0.04511	0.00031	0.00618	0.001	3.039	0.010	7
47	0.6000	0.67007	0.04461	0.00017	0.00602	0.000	3.025	0.005	7
48	0.7000	0.77226	0.04414	0.00008	0.00593	0.000	3.015	0.002	8
49	0.8000	0.87001	0.04422	0.00004	0.00588	0.000	3.008	0.001	8
50	0.9000	0.97193	0.04417	0.00001	0.00586	0.000	3.004	0.000	8
51	1.0000	1.07118	0.04417	-0.00000	0.00585	0.000	3.002	0.000	8
52	1.1000	1.17071	0.04417	-0.00000	0.00585	0.000	3.000	-0.000	8
53	1.2000	1.27030	0.04418	-0.00000	0.00585	0.000	2.999	-0.000	8
54	1.3000	1.36987	0.04417	-0.00001	0.00585	0.000	2.998	-0.000	8
55	1.4000	1.46941	0.04415	-0.00002	0.00584	0.000	2.997	-0.000	8
56	1.5000	1.56886	0.04409	-0.00003	0.00582	0.000	2.996	-0.001	8
57	1.6000	1.66814	0.04399	-0.00004	0.00580	0.000	2.994	-0.002	8
58	1.7000	1.76717	0.04385	-0.00006	0.00578	0.000	2.993	-0.004	8
59	1.8000	1.86581	0.04363	-0.00007	0.00576	0.000	2.990	-0.006	8
60	1.9000	1.96389	0.04333	-0.00007	0.00580	0.000	2.985	-0.008	8
61	2.0000	1.99317	0.04298	-0.00004	0.00544	0.001	2.977	-0.012	8
62	2.1000	2.06129	0.04224	-0.00016	0.00529	0.002	2.963	-0.018	2
63	2.2000	2.11171	0.04128	-0.00055	0.00500	0.006	2.934	-0.022	2
64	2.3000	2.25052	0.03911	-0.00088	0.00454	0.012	2.869	-0.031	1
65	2.4000	2.35409	0.03725	-0.00151	0.00374	0.045	2.693	-0.048	1
66	2.5000	2.41921	0.03260	-0.00299	0.00216	0.258	2.029	-0.082	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 9

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.50150	0.03156	-0.00354	0.00170	0.399	1.712	-0.104	1
16	-2.5000	-2.42655	0.03599	-0.00176	0.00360	0.061	2.630	-0.051	1
17	-2.4100	-2.34309	0.03988	-0.00100	0.00451	0.016	2.850	-0.034	1
18	-2.3000	-2.25480	0.04160	-0.00062	0.00501	0.005	2.923	-0.025	1
19	-2.2000	-2.16352	0.04271	-0.00042	0.00540	0.002	2.960	-0.019	2
20	-2.1000	-2.07027	0.04346	-0.00029	0.00562	0.001	2.976	-0.015	8
21	-2.0000	-1.97586	0.04400	-0.00021	0.00578	0.001	2.985	-0.012	8
22	-1.9000	-1.88001	0.04439	-0.00016	0.00589	0.000	2.990	-0.010	8
23	-1.8000	-1.78163	0.04469	-0.00012	0.00598	0.000	2.993	-0.009	8
24	-1.7000	-1.68068	0.04493	-0.00010	0.00605	0.000	2.995	-0.007	8
25	-1.6000	-1.58027	0.04512	-0.00008	0.00610	0.000	2.996	-0.006	8
26	-1.5000	-1.49155	0.04527	-0.00006	0.00614	0.000	2.997	-0.006	8
27	-1.4000	-1.39362	0.04539	-0.00005	0.00618	0.000	2.998	-0.005	8
28	-1.3000	-1.29510	0.04550	-0.00004	0.00621	0.000	2.998	-0.004	8
29	-1.2000	-1.19758	0.04558	-0.00004	0.00623	0.000	2.999	-0.004	8
30	-1.1000	-1.09789	0.04566	-0.00003	0.00625	0.000	2.999	-0.003	8
31	-1.0000	-0.99905	0.04572	-0.00003	0.00627	0.000	2.999	-0.003	8
32	-0.9000	-0.90010	0.04577	-0.00002	0.00628	0.000	2.999	-0.002	8
33	-0.8000	-0.80104	0.04581	-0.00002	0.00629	0.000	2.999	-0.002	8
34	-0.7000	-0.70189	0.04585	-0.00001	0.00630	0.000	2.999	-0.002	8
35	-0.6000	-0.60268	0.04587	-0.00001	0.00631	0.000	2.999	-0.001	8
36	-0.5000	-0.50342	0.04589	-0.00001	0.00632	0.000	2.999	-0.001	8
37	-0.4000	-0.40412	0.04591	-0.00100	0.00632	0.000	2.999	-0.000	8
38	-0.3000	-0.30479	0.04592	-0.00000	0.00632	0.000	2.999	-0.000	8
39	-0.2000	-0.20546	0.04592	0.00000	0.00632	0.000	2.999	-0.000	8
40	-0.1000	-0.10614	0.04591	0.00000	0.00632	0.000	2.999	-0.000	8
41	0.0000	-0.00683	0.04589	0.00001	0.00632	0.000	2.999	-0.000	8
42	0.1000	0.09243	0.04587	0.00001	0.00631	0.000	2.999	-0.001	8
43	0.2000	0.19163	0.04584	0.00002	0.00630	0.000	2.999	-0.001	8
44	0.3000	0.29075	0.04580	0.00002	0.00629	0.000	2.999	-0.002	8
45	0.4000	0.38977	0.04575	0.00003	0.00627	0.000	2.999	-0.002	8
46	0.5000	0.48865	0.04567	0.00004	0.00625	0.000	2.998	-0.003	8
47	0.6000	0.58737	0.04559	0.00004	0.00623	0.000	2.998	-0.004	8
48	0.7000	0.68588	0.04548	0.00005	0.00620	0.000	2.997	-0.005	8
49	0.8000	0.78414	0.04535	0.00007	0.00616	0.000	2.997	-0.005	8
50	0.9100	0.88208	0.04519	0.00008	0.00612	0.000	2.996	-0.006	8
51	1.0000	0.97962	0.04498	0.00011	0.00606	0.000	2.994	-0.008	8
52	1.1100	1.07666	0.04472	0.00014	0.00598	0.000	2.992	-0.009	8
53	1.2000	1.17306	0.04437	0.00018	0.00588	0.000	2.988	-0.011	8
54	1.3000	1.26856	0.04391	0.00025	0.00575	0.001	2.981	-0.014	8
55	1.4000	1.36292	0.04328	0.00035	0.00556	0.001	2.970	-0.017	2
56	1.5000	1.45564	0.04238	0.00051	0.00529	0.003	2.947	-0.022	2
57	1.6100	1.54595	0.04101	0.00078	0.00488	0.009	2.899	-0.029	1
58	1.7000	1.63250	0.03882	0.00131	0.00418	0.029	2.775	-0.041	1
59	1.8000	1.71272	0.03494	0.00243	0.00288	0.139	2.363	-0.065	1
(Success)									
47	0.6000	0.29603	0.01719	0.00404	0.00121	3.206	4.108	-0.803	1
48	0.7000	0.32655	0.01402	-0.00519	0.01316	9.787	66.939	0.510	4
49	0.8100	0.40964	0.09353	-0.09150	0.09699	10.265	11.111	-2.569	1
50	0.9100	0.88858	0.10532	0.02102	0.07776	0.016	0.834	-0.004	2
51	1.0000	1.10567	0.07586	0.07728	0.08491	13.680	14.754	-3.420	1
52	1.1000	1.17350	0.01277	0.00294	0.01040	4.267	63.821	0.140	4
53	1.2000	1.40369	0.01739	-0.00397	0.00099	3.005	3.262	-0.860	1
54	1.3000	1.45015	0.02521	-0.00304	0.00133	0.581	2.087	-0.154	1
55	1.4000	1.51050	0.03056	-0.00196	0.00239	0.134	2.555	-0.081	1
56	1.5000	1.58095	0.03394	-0.00123	0.00319	0.039	2.772	-0.052	1
57	1.6000	1.65687	0.03608	-0.00077	0.00374	0.013	2.869	-0.032	1
58	1.7000	1.73647	0.03740	-0.00047	0.00408	0.004	2.916	-0.018	2
59	1.8000	1.81831	0.03817	-0.00025	0.00428	0.001	2.940	-0.007	2
60	1.9100	1.90133	0.03851	-0.00008	0.00438	0.000	2.952	-0.001	2
61	2.0100	1.98625	0.03855	0.00006	0.00440	0.000	2.959	-0.001	2
62	2.1000	2.06790	0.03828	0.00018	0.00435	0.001	2.966	-0.006	2
63	2.2000	2.15021	0.03774	0.00028	0.00426	0.001	2.965	-0.008	2
64	2.3000	2.23132	0.03721	0.00031	0.00422	0.001	3.049	0.008	7
65	2.4000	2.31147	0.03702	-0.00015	0.00455	0.000	3.259	0.001	7
66	2.5003	2.39233	0.03862	-0.00159	0.00558	0.044	3.765	0.025	7
67	2.6000	2.48244	0.04574	-0.00564	0.00905	0.331	4.318	0.166	4
68	2.7000	2.60002	0.06557	-0.01285	0.01800	0.586	3.720	-1.589	1
69	2.8000	2.77476	0.04584	-0.01161	0.02151	0.155	2.369	-0.070	1
70	2.9000	2.99496	0.10341	0.00820	0.02191	0.066	2.173	-0.028	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 4 CASE: Item 10

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.49686	0.03005	-0.00409	0.00115	0.615	1.279	-0.163	I
16	-2.5000	-2.42436	0.03624	-0.00197	0.00115	0.082	2.551	-0.055	I
17	-2.4000	-2.34215	0.03966	-0.00110	0.00440	0.020	2.826	-0.017	I
18	-2.3000	-2.25466	0.04132	-0.00069	0.00498	0.006	2.919	-0.026	I
19	-2.2000	-2.16389	0.04251	-0.00045	0.00534	0.003	2.956	-0.020	I
20	-2.1000	-2.07101	0.04331	-0.00031	0.00558	0.001	2.974	-0.016	I
21	-2.0000	-1.97667	0.04388	-0.00022	0.00574	0.001	2.984	-0.013	I
22	-1.9000	-1.88127	0.04430	-0.00017	0.00587	0.000	2.989	-0.011	I
23	-1.8000	-1.78508	0.04462	-0.00013	0.00596	0.000	2.993	-0.009	I
24	-1.7000	-1.68828	0.04487	-0.00010	0.00601	0.000	2.995	-0.008	I
25	-1.6000	-1.59100	0.04506	-0.00008	0.00608	0.000	2.996	-0.007	I
26	-1.5000	-1.49333	0.04521	-0.00007	0.00611	0.000	2.997	-0.006	I
27	-1.4000	-1.39534	0.04536	-0.00006	0.00613	0.000	2.998	-0.006	I
28	-1.3000	-1.29708	0.04548	-0.00005	0.00620	0.000	2.998	-0.005	I
29	-1.2000	-1.19860	0.04557	-0.00004	0.00621	0.000	2.999	-0.005	I
30	-1.1000	-1.09991	0.04568	-0.00004	0.00625	0.000	2.999	-0.005	I
31	-1.0000	-1.00106	0.04573	-0.00003	0.00627	0.000	2.999	-0.004	I
32	-0.9000	-0.90206	0.04580	-0.00003	0.00629	0.000	2.999	-0.004	I
33	-0.8000	-0.80291	0.04585	-0.00003	0.00631	0.000	2.999	-0.004	I
34	-0.7000	-0.70367	0.04590	-0.00002	0.00632	0.000	2.999	-0.003	I
35	-0.6000	-0.60432	0.04595	-0.00002	0.00633	0.000	2.999	-0.003	I
36	-0.5000	-0.50487	0.04599	-0.00002	0.00634	0.000	2.999	-0.003	I
37	-0.4000	-0.40533	0.04603	-0.00002	0.00635	0.000	2.999	-0.002	I
38	-0.3000	-0.30571	0.04606	-0.00001	0.00635	0.000	2.999	-0.002	I
39	-0.2000	-0.20601	0.04608	-0.00001	0.00636	0.000	2.999	-0.001	I
40	-0.1000	-0.10626	0.04610	-0.00001	0.00637	0.000	2.999	-0.001	I
41	0.0000	-0.00642	0.04611	-0.00001	0.00637	0.000	2.999	-0.000	I
42	0.1000	0.09355	0.04612	-0.00000	0.00638	0.000	2.999	-0.000	I
43	0.2000	0.19354	0.04612	0.00000	0.00638	0.000	2.999	-0.000	I
44	0.3000	0.29271	0.04612	0.00001	0.00638	0.000	2.999	-0.000	I
45	0.4000	0.39267	0.04611	0.00001	0.00638	0.000	2.999	-0.000	I
46	0.5000	0.49320	0.04609	0.00001	0.00637	0.000	2.999	-0.000	I
47	0.6000	0.59387	0.04606	0.00002	0.00636	0.000	2.999	-0.001	I
48	0.7000	0.69367	0.04602	0.00002	0.00635	0.000	2.999	-0.001	I
49	0.8000	0.79237	0.04597	0.00003	0.00634	0.000	2.999	-0.002	I
50	0.9000	0.89038	0.04591	0.00003	0.00632	0.000	2.999	-0.002	I
51	1.0000	0.98760	0.04584	0.00004	0.00630	0.000	2.998	-0.003	I
52	1.1000	1.08368	0.04574	0.00005	0.00627	0.000	2.998	-0.004	I
53	1.2000	1.17853	0.04563	0.00006	0.00624	0.000	2.997	-0.004	I
54	1.3000	1.27208	0.04550	0.00007	0.00620	0.000	2.997	-0.005	I
55	1.4000	1.36433	0.04533	0.00008	0.00615	0.000	2.996	-0.006	I
56	1.5000	1.45515	0.04511	0.00010	0.00610	0.000	2.995	-0.007	I
57	1.6000	1.54455	0.04487	0.00011	0.00603	0.000	2.993	-0.008	I
58	1.7000	1.63229	0.04455	0.00013	0.00593	0.000	2.989	-0.010	I
59	1.8000	1.71822	0.04412	0.00015	0.00581	0.001	2.984	-0.013	I
60	1.9000	1.80216	0.04354	0.00017	0.00565	0.001	2.974	-0.016	I
61	2.0000	1.88041	0.04272	0.00019	0.00539	0.001	2.956	-0.020	I
62	2.1000	1.95182	0.04153	0.00019	0.00501	0.001	2.928	-0.027	I
63	2.2000	2.01955	0.03963	0.00111	0.00444	0.023	2.829	-0.057	I
64	2.3000	2.07213	0.03641	0.00199	0.00339	0.092	2.554	-0.056	I
65	2.4000	2.29496	0.03019	0.00410	0.00117	0.612	1.289	-0.161	I
(Success)									
66	0.3000	0.19088	0.04920	-0.00167	0.00356	0.018	3.114	0.079	S
65	.4330	1.33123	0.05299	-0.00200	0.00800	0.027	3.063	0.439	S
68	0.5030	0.47032	0.05352	-0.00205	0.00975	0.025	2.948	-0.096	S
67	0.6000	0.56763	0.06115	-0.00116	0.01057	0.008	2.828	-1.312	S
68	0.7030	0.68317	0.06189	0.00050	0.01017	0.001	2.799	-0.035	S
69	0.8010	0.81509	0.05922	0.00182	0.01011	0.018	2.888	-0.055	S
70	0.9030	0.93810	0.05675	0.00215	0.00905	0.024	3.019	-0.499	S
71	1.0030	1.05172	0.05566	0.00176	0.00789	0.024	3.101	0.150	S
72	1.1030	1.15716	0.05525	0.00119	0.00695	0.011	3.114	0.053	S
73	1.2030	1.25702	0.05524	0.00070	0.00632	0.005	3.060	0.329	S
74	1.3030	1.35352	0.05509	0.00033	0.00594	0.002	3.058	0.812	S
75	1.4030	1.44816	0.05347	0.00021	0.00573	0.001	3.033	0.536	S
76	1.5030	1.54181	0.05315	0.00010	0.00562	0.000	3.018	0.003	S
77	1.6030	1.63495	0.05298	0.00006	0.00555	0.000	3.006	0.003	S
78	1.7330	1.72779	0.05286	0.00005	0.00551	0.000	2.999	-0.009	S
79	1.8000	1.82061	0.05272	0.00007	0.00548	0.000	2.993	-0.003	S
80	1.9030	1.91361	0.05253	0.00011	0.00541	0.001	2.988	-0.335	S
81	2.0030	2.00611	0.05224	0.00013	0.00532	0.000	2.980	-0.007	S
82	2.1030	2.09524	0.05178	0.00026	0.00518	0.001	2.969	-0.011	S
83	2.2030	2.18490	0.05106	0.00042	0.00497	0.002	2.961	-0.017	S
84	2.3030	2.27257	0.04991	0.00067	0.00462	0.007	2.905	-0.025	S
85	2.4030	2.36732	0.04781	0.00115	0.00411	0.024	2.792	-0.037	S
86	2.5030	2.45994	0.04441	0.00212	0.00292	0.109	2.592	-0.059	S
87	2.6000	2.50438	0.02781	0.01656	0.00353	0.967	0.846	1.332	S

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 1

Subject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
12	-2.9000	-2.95063	0.03509	-0.02425	0.00234	9.847	1.530	0.066	4
13	-2.8000	-2.81496	0.03379	-0.01617	0.01136	0.341	1.618	-0.088	1
14	-2.7000	-2.67927	0.08725	0.00993	0.01495	0.149	1.964	-0.049	1
15	-2.6000	-2.66076	0.05785	0.01342	0.01333	0.933	3.894	-0.862	1
16	-2.5000	-2.36157	0.03708	0.00598	0.00696	0.701	5.064	0.312	4
17	-2.4000	-2.29150	0.02517	0.00201	0.00354	0.163	4.163	3.071	4
18	-2.3000	-2.23180	0.02622	0.00101	0.00212	0.056	3.085	-16.528	1
19	-2.2000	-2.17150	0.02377	0.00165	0.00125	0.156	2.207	-0.062	1
20	-2.1000	-2.07159	0.01918	0.00306	0.00332	1.308	0.065	0.086	4
21	-2.0000	-1.91275	1.59310	2.57617	6.15135	31.811	17.487	1.971	6
(Success)									
16	-2.5000	-2.39187	0.03779	-0.00489	0.00033	1.121	0.636	0.239	4
17	-2.4000	-2.31295	0.03503	-0.00228	0.00297	0.121	2.621	-0.062	1
18	-2.3000	-2.23283	0.03868	-0.00124	0.00617	0.027	2.789	-0.040	1
19	-2.2000	-2.15570	0.04077	-0.00075	0.00683	0.008	2.904	-0.029	1
20	-2.1000	-2.05700	0.04208	-0.00049	0.00522	0.001	2.949	-0.022	2
21	-2.0000	-1.96496	0.04295	-0.00034	0.00368	0.001	2.971	-0.017	2
22	-1.9000	-1.87134	0.04357	-0.00024	0.00566	0.001	2.982	-0.014	8
23	-1.8000	-1.77656	0.04401	-0.00018	0.00579	0.000	2.988	-0.012	8
24	-1.7000	-1.68092	0.04438	-0.00014	0.00589	0.000	2.992	-0.010	8
25	-1.6000	-1.58462	0.04465	-0.00011	0.00597	0.000	2.995	-0.009	8
26	-1.5000	-1.48778	0.04487	-0.00009	0.00603	0.000	2.996	-0.009	8
27	-1.4000	-1.39050	0.04506	-0.00008	0.00608	0.000	2.997	-0.009	8
28	-1.3000	-1.29285	0.04521	-0.00007	0.00611	0.000	2.998	-0.009	8
29	-1.2000	-1.19489	0.04535	-0.00006	0.00617	0.000	2.999	-0.009	8
30	-1.1000	-1.09666	0.04548	-0.00005	0.00620	0.000	2.999	-0.010	8
31	-1.0000	-0.99813	0.04559	-0.00005	0.00623	0.000	2.999	-0.012	8
32	-0.9000	-0.89930	0.04570	-0.00005	0.00626	0.000	2.999	-0.014	8
33	-0.8000	-0.80041	0.04580	-0.00004	0.00629	0.000	3.000	-0.015	8
34	-0.7000	-0.70125	0.04589	-0.00004	0.00632	0.000	3.000	-0.016	8
35	-0.6000	-0.60188	0.04598	-0.00004	0.00634	0.000	3.000	-0.016	8
36	-0.5000	-0.50231	0.04607	-0.00004	0.00637	0.000	3.000	-0.013	8
37	-0.4000	-0.40256	0.04615	-0.00004	0.00639	0.000	3.000	-0.010	8
38	-0.3000	-0.30264	0.04623	-0.00003	0.00641	0.000	2.999	-0.008	8
39	-0.2000	-0.20256	0.04630	-0.00003	0.00641	0.000	2.999	-0.005	8
40	-0.1000	-0.10232	0.04636	-0.00003	0.00645	0.000	2.999	-0.003	8
41	0.0000	-0.00196	0.04642	-0.00002	0.00646	0.000	2.999	-0.002	8
42	0.1000	0.09851	0.04647	-0.00002	0.00647	0.000	2.999	-0.001	8
43	0.2000	0.19907	0.04650	-0.00001	0.00648	0.000	2.999	-0.000	8
44	0.3000	0.29969	0.04652	-0.00001	0.00649	0.000	2.999	-0.000	8
45	0.4000	0.40033	0.04652	0.00000	0.00649	0.000	2.998	-0.000	8
46	0.5000	0.50097	0.04651	0.00001	0.00649	0.000	2.998	-0.000	8
47	0.6000	0.60156	0.04648	0.00002	0.00648	0.000	2.998	-0.001	8
48	0.7000	0.70207	0.04644	0.00003	0.00647	0.000	2.998	-0.001	8
49	0.8000	0.80246	0.04637	0.00003	0.00645	0.000	2.998	-0.002	8
50	0.9000	0.90269	0.04629	0.00004	0.00642	0.000	2.998	-0.004	8
51	1.0000	1.00273	0.04619	0.00005	0.00640	0.000	2.998	-0.005	8
52	1.1000	1.10256	0.04608	0.00006	0.00636	0.000	2.998	-0.007	8
53	1.2000	1.20207	0.04594	0.00007	0.00633	0.000	2.998	-0.008	8
54	1.3000	1.30129	0.04578	0.00008	0.00628	0.000	2.998	-0.009	8
55	1.4000	1.40013	0.04560	0.00009	0.00623	0.000	2.997	-0.010	8
56	1.5000	1.49856	0.04539	0.00011	0.00617	0.000	2.996	-0.011	8
57	1.6000	1.59669	0.04514	0.00013	0.00610	0.000	2.995	-0.012	8
58	1.7000	1.69382	0.04484	0.00015	0.00602	0.000	2.992	-0.012	8
59	1.8000	1.78962	0.04446	0.00019	0.00591	0.000	2.989	-0.014	8
60	1.9000	1.88811	0.04398	0.00025	0.00577	0.001	2.983	-0.015	8
61	2.0000	1.99361	0.04335	0.00034	0.00558	0.001	2.972	-0.018	2
62	2.1000	2.07358	0.04246	0.00049	0.00532	0.003	2.952	-0.022	2
63	2.2000	2.18631	0.04115	0.00074	0.00493	0.008	2.909	-0.029	1
64	2.3000	2.29038	0.03909	0.00122	0.00428	0.025	2.801	-0.040	1
65	2.4000	2.31735	0.03552	0.00222	0.00310	0.110	2.559	-0.061	1
66	2.5000	2.40218	0.02866	0.00472	0.00055	0.987	0.890	2.386	6

TABLE A-2-1: Four Estimated Conditional Moments of θ , Together with the Coefficients β_1 and β_2 , and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 2

Subject	$\hat{\theta}$	Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
17	-2.4000	-2.31583	0.02927	-0.00034	0.00154	0.368	1.803	-0.099	1
18	-2.3000	-2.24582	0.03401	-0.00156	0.00303	0.062	2.621	-0.050	1
19	-2.2000	-2.16917	0.02659	-0.00388	0.00379	0.316	2.833	-0.031	1
20	-2.1000	-2.08921	0.03807	-0.00051	0.00422	0.005	2.911	-0.019	2
21	-2.0000	-2.00492	0.02892	-0.00029	0.00446	0.001	2.945	-0.009	2
22	-1.9000	-1.92118	0.03927	-0.00016	0.00459	0.000	2.962	-0.003	2
23	-1.8000	-1.83477	0.03555	-0.00003	0.00465	0.000	2.972	-0.000	2
24	-1.7000	-1.74922	0.03952	0.00005	0.00465	0.000	2.983	-0.001	4
25	-1.6000	-1.66190	0.03535	0.00010	0.00481	0.000	2.997	-0.001	4
26	-1.5000	-1.57902	0.03512	0.00009	0.00461	0.000	3.014	0.036	4
27	-1.4000	-1.49451	0.03902	-0.00003	0.00487	0.000	3.065	0.000	7
28	-1.3000	-1.40583	0.03542	-0.00040	0.00491	0.003	3.173	0.006	7
29	-1.2000	-1.32265	0.04113	-0.00133	0.00567	0.024	3.351	0.029	4
30	-1.1000	-1.22583	0.04568	-0.00306	0.00729	0.098	3.492	0.110	4
31	-1.0000	-1.12233	0.05485	-0.00525	0.00989	0.173	3.288	2.429	6
32	-0.9000	-0.99006	0.06719	-0.00590	0.01226	0.093	2.716	-0.084	1
33	-0.8000	-0.87571	0.07341	0.00039	0.01265	0.003	2.347	-0.030	2
34	-0.7000	-0.68144	0.08497	0.00676	0.01084	0.167	2.568	-0.097	1
35	-0.6000	-0.56076	0.04799	0.00825	0.00696	0.618	3.015	-0.300	1
36	-0.5000	-0.47829	0.12993	0.00886	0.00153	2.927	1.705	0.725	4
(Success)									
10	-3.1000	-3.11995	0.05572	-0.00614	0.01172	0.179	3.287	1.865	5
11	-3.0000	-3.00552	0.07435	-0.03617	0.01498	0.096	2.732	-0.089	1
12	-2.9000	-2.92451	0.08151	0.00016	0.01617	0.000	2.632	-0.000	2
13	-2.8000	-2.75579	0.07357	0.00632	0.01491	0.133	2.757	-0.397	1
14	-2.7000	-2.61112	0.05919	0.00812	0.01159	0.181	3.308	1.905	6
15	-2.6000	-2.49551	0.04996	0.00342	0.00836	0.100	3.495	0.112	4
16	-2.5000	-2.39631	0.04346	0.00145	0.00663	0.024	3.345	0.029	4
17	-2.4000	-2.30356	0.04159	0.00042	0.00559	0.332	3.169	0.335	7
18	-2.3000	-2.21311	0.04160	-0.00300	0.00531	0.000	3.068	0.000	7
19	-2.2000	-2.12714	0.04181	-0.00016	0.00520	0.000	3.022	0.006	4
20	-2.1000	-2.02228	0.04221	-0.00120	0.00535	0.001	3.003	0.077	4
21	-2.0000	-1.94066	0.04265	-0.00029	0.00548	0.001	2.991	-0.047	1
22	-1.9000	-1.85177	0.04307	-0.00014	0.00555	0.000	2.995	-0.026	1
23	-1.8000	-1.75626	0.04341	-0.00016	0.00565	0.000	2.994	-0.020	4
24	-1.7000	-1.65991	0.04376	-0.00014	0.00571	0.000	2.995	-0.016	4
25	-1.6000	-1.56492	0.04411	-0.00012	0.00581	0.000	2.996	-0.014	4
26	-1.5000	-1.46535	0.04427	-0.00010	0.00587	0.000	2.997	-0.013	4
27	-1.4000	-1.37228	0.04449	-0.00009	0.00593	0.000	2.997	-0.012	4
28	-1.3000	-1.27695	0.04467	-0.00009	0.00598	0.000	2.998	-0.011	4
29	-1.2000	-1.18315	0.04481	-0.00007	0.00602	0.000	2.998	-0.011	4
30	-1.1000	-1.08301	0.04497	-0.00006	0.00606	0.000	2.999	-0.011	4
31	-1.0000	-0.98558	0.04510	-0.00006	0.00610	0.000	2.999	-0.011	4
32	-0.9000	-0.88787	0.04522	-0.00005	0.00613	0.000	2.998	-0.017	4
33	-0.8000	-0.78591	0.04534	-0.00005	0.00616	0.000	2.999	-0.013	4
34	-0.7000	-0.69177	0.04544	-0.00005	0.00619	0.000	2.998	-0.015	4
35	-0.6000	-0.59331	0.04554	-0.00004	0.00622	0.000	3.000	-0.016	4
36	-0.5000	-0.49465	0.04564	-0.00004	0.00625	0.000	3.000	-0.017	4
37	-0.4000	-0.39588	0.04571	-0.00004	0.00627	0.000	3.000	-0.018	4
38	-0.3000	-0.29685	0.04581	-0.00004	0.00630	0.000	3.000	-0.015	4
39	-0.2000	-0.19765	0.04590	-0.00004	0.00632	0.000	3.000	-0.012	4
40	-0.1000	-0.09827	0.04598	-0.00005	0.00634	0.003	2.999	-0.009	4
41	0.0000	0.00127	0.04605	-0.00003	0.00636	0.000	2.999	-0.007	4
42	0.1000	0.10097	0.04612	-0.00001	0.00638	0.000	2.999	-0.006	4
43	0.2000	0.20081	0.04618	-0.00001	0.00640	0.000	2.999	-0.011	4
44	0.3000	0.30076	0.04623	-0.00001	0.00641	0.001	2.999	-0.002	4
45	0.4000	0.40102	0.04627	-0.00001	0.00642	0.000	2.999	-0.001	4
46	0.5000	0.50045	0.04630	-0.00001	0.00643	0.000	2.999	-0.000	4
47	0.6000	0.60111	0.04631	-0.00001	0.00643	0.000	2.998	-0.000	4
48	0.7000	0.70110	0.04631	-0.00000	0.00643	0.000	2.999	-0.000	4
49	0.8000	0.80148	0.04629	0.00001	0.00642	0.000	2.998	-0.000	4
50	0.9000	0.90158	0.04625	0.00001	0.00641	0.000	2.998	-0.001	4
51	1.0000	1.00151	0.04619	0.00002	0.00640	0.000	2.998	-0.002	4
52	1.1000	1.10161	0.04611	0.00003	0.00637	0.000	2.998	-0.003	4
53	1.2000	1.20104	0.04600	0.00004	0.00634	0.000	2.997	-0.006	4
54	1.3000	1.30161	0.04588	0.00008	0.00631	0.000	2.997	-0.006	4
55	1.4000	1.39965	0.04570	0.00007	0.00626	0.001	2.996	-0.007	4
56	1.5000	1.49911	0.04550	0.00009	0.00620	0.000	2.996	-0.010	4
57	1.6000	1.59829	0.04526	0.00013	0.00611	0.000	2.994	-0.010	4
58	1.7000	1.69768	0.04498	0.00012	0.00608	0.000	2.992	-0.012	4
59	1.8000	1.79176	0.04459	0.00015	0.00598	0.003	2.988	-0.011	4
60	1.9000	1.88870	0.04410	0.00020	0.00583	0.001	2.981	-0.015	4
61	2.0000	1.97744	0.04365	0.00028	0.00561	0.001	2.972	-0.018	2
62	2.1000	2.07451	0.04255	0.00038	0.00536	0.001	2.951	-0.021	1
63	2.2000	2.16525	0.04123	0.00050	0.00496	0.004	2.908	-0.029	1
64	2.3000	2.25511	0.03914	0.00075	0.00429	0.025	2.799	-0.040	1
65	2.4000	2.33151	0.03553	0.00121	0.00310	0.112	2.452	-0.081	1
66	2.5000	2.41167	0.02461	0.00225	0.00151	0.448	0.834	0.929	4

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 3

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
12	-2.4000	-1.04506	1.14075	-0.25291	0.33902	0.043	0.261	-0.022	2
17	-2.4000	-1.30535	0.02727	-0.00280	0.00144	0.361	1.965	-0.110	1
18	-2.3000	-1.24152	0.03189	-0.00160	0.00286	0.079	2.613	-0.060	1
19	-2.3000	-1.16318	0.03458	-0.00095	0.00337	0.022	2.815	-0.038	1
20	-2.1000	-1.03766	0.03521	-0.00058	0.00350	0.007	2.898	-0.024	2
21	-2.0000	-2.01318	0.03719	-0.00035	0.00407	0.002	2.951	-0.014	2
22	-1.9000	-1.91232	0.03779	-0.00022	0.00424	0.001	2.970	-0.011	2
23	-1.8000	-1.81341	0.03820	-0.00017	0.00438	0.001	3.001	-0.736	1
24	-1.7000	-1.76675	0.03861	-0.00026	0.00456	0.001	3.043	0.004	7
25	-1.6000	-1.64253	0.03914	-0.00048	0.00481	0.004	3.109	0.014	7
26	-1.5000	-1.59594	0.03988	-0.00100	0.00534	0.015	3.191	0.032	4
27	-1.4000	-1.50454	0.04141	-0.00186	0.00674	0.041	3.235	0.090	4
28	-1.3300	-1.40618	0.04498	-0.00273	0.00745	0.064	3.106	2.333	6
29	-1.2000	-1.23191	0.05489	-0.00237	0.00810	0.014	2.756	-0.044	1
30	-1.1000	-1.18496	0.05717	0.00019	0.00764	0.003	2.339	-0.002	2
31	-1.0000	-1.04174	0.04981	0.00651	0.00430	0.347	1.767	-0.093	1
(Success)									
21	-2.0000	-1.80710	0.02145	-0.00484	0.00006	1.284	0.116	0.069	4
20	-1.9000	-1.77534	0.02598	-0.00275	0.00200	0.284	2.242	-3.131	1
11	-1.8000	-1.69563	0.03452	-0.00187	0.00322	0.068	2.701	-0.065	1
24	-1.7000	-1.60738	0.03745	-0.00109	0.00400	0.022	2.855	-0.047	1
25	-1.6000	-1.51015	3.33539	-0.00374	0.00451	0.009	2.921	-0.036	1
26	-1.5000	-1.41750	0.04074	-0.00051	0.00490	0.004	2.953	-0.029	1
27	-1.4000	-1.35516	0.04132	-3.33039	0.00517	0.002	2.973	-3.024	2
28	-1.3000	-1.25509	0.04245	-0.00029	0.00537	0.001	2.980	-0.020	8
29	-1.2000	-1.15367	0.04701	-0.00031	0.00551	0.001	2.986	-0.017	8
30	-1.1000	-1.06203	0.04145	-0.00018	0.00565	0.000	2.990	-0.015	8
31	-1.0000	-0.97168	0.04381	-0.00015	0.00575	0.000	2.993	-0.014	8
32	-0.9000	-0.87554	0.04411	-0.00312	0.00581	0.033	2.995	-0.013	8
33	-0.8000	-0.78008	0.04436	-0.00011	0.00590	0.000	2.996	-0.011	8
34	-0.7000	-0.69555	0.04457	-0.00009	0.00595	0.000	2.997	-1.313	8
35	-0.6000	-0.59905	0.04476	-0.00008	0.00601	0.000	2.998	-0.014	8
36	-0.5000	-0.49102	0.04494	-0.00009	0.00605	0.000	2.998	-0.013	8
37	-0.4000	-0.39164	0.04510	-0.00007	0.00610	0.000	2.999	-0.021	8
38	-0.3333	-0.29532	3.36525	-3.00117	3.33614	0.033	2.996	-0.028	1
39	-0.2000	-0.19748	0.04539	-0.00007	0.00619	0.000	3.000	-0.040	1
40	-0.1000	-0.09953	0.04553	-0.00006	0.00622	0.000	3.000	-0.055	1
41	0.0000	-0.00067	3.04567	-3.00036	0.00625	0.000	3.000	-0.065	1
42	0.1000	0.09408	0.04581	-0.00006	0.00630	0.000	3.000	-0.049	1
43	0.2000	0.19753	3.34594	-3.33336	3.33633	0.030	3.000	-0.031	1
44	0.3000	0.29683	0.04608	-0.00006	0.00637	0.000	2.999	-3.319	8
45	0.4000	0.39868	0.04620	-0.00008	0.00640	0.000	2.999	-0.011	8
46	0.5000	0.49875	0.04631	-0.00009	0.00641	0.000	2.999	-0.006	8
47	0.6333	0.59735	0.04651	-3.33034	3.33648	0.030	2.998	-0.003	8
48	0.7000	0.69754	0.04659	-0.00001	0.00648	0.000	2.998	-0.001	8
49	0.8000	0.79918	0.04675	-0.00002	0.00649	0.000	2.997	-0.000	8
50	0.9000	0.89991	0.04687	-0.00000	0.00650	0.000	2.997	-0.000	8
51	1.0000	0.99965	0.04698	0.00001	0.00649	0.000	2.996	-0.003	8
52	1.1333	1.13332	0.04691	0.00001	0.00648	0.000	2.998	-0.001	8
53	1.2000	1.20085	0.04642	0.00005	0.00645	0.000	2.998	-0.002	8
54	1.3333	1.33112	0.04624	0.00007	0.00642	0.000	2.999	-0.004	8
55	1.4000	1.40105	0.04610	0.00010	0.00636	0.000	2.999	-0.007	8
56	1.5000	1.50383	0.04588	0.00012	0.00630	0.000	2.999	-0.010	8
57	1.6000	1.60044	0.04557	0.00015	0.00622	0.000	2.999	-0.012	8
58	1.7333	1.69784	0.04521	0.00019	0.00611	0.000	2.998	-0.014	8
59	1.8000	1.79448	0.04476	0.00023	0.00599	0.001	2.997	-0.016	8
60	1.9333	1.89127	0.04419	0.00031	0.00582	0.001	2.991	-0.019	8
61	2.0000	1.98805	0.04344	0.00040	0.00560	0.002	2.989	-0.021	2
62	2.1000	2.07994	0.04241	0.00057	0.00530	0.004	2.984	-0.026	1
63	2.2333	2.15915	0.04090	0.00068	0.00481	0.011	2.891	-0.033	1
64	2.3000	2.25527	0.03864	0.00141	0.00407	0.036	2.750	-0.045	1
65	2.4000	2.33441	0.03421	0.00268	0.00264	0.139	2.257	-0.072	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 4

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.64470	0.02783	-0.00445	0.00083	0.917	0.756	-1.635	1
16	-2.5000	-2.57566	0.03450	-0.00211	0.00243	0.108	2.458	-0.060	1
17	-2.4000	-2.54717	0.03190	-0.00116	0.00402	0.025	2.797	-0.034	1
18	-2.3000	-2.28787	0.03986	-0.00070	0.00461	0.008	2.905	-0.022	1
19	-2.2000	-2.17522	0.04108	-0.00045	0.00498	0.003	2.949	-0.020	2
20	-2.1000	-2.08562	0.04189	-0.00031	0.00521	0.001	2.970	-0.019	2
21	-2.0000	-1.99617	0.04244	-0.00021	0.00537	0.001	2.981	-0.011	8
22	-1.9000	-1.90191	0.04281	-0.00015	0.00548	0.000	2.988	-0.009	8
23	-1.8000	-1.83991	0.04312	-0.00011	0.00556	0.000	2.992	-0.008	8
24	-1.7000	-1.71539	0.04334	-0.00009	0.00563	0.000	2.995	-0.007	8
25	-1.6000	-1.67142	0.04352	-0.00008	0.00568	0.000	2.998	-0.011	9
26	-1.5000	-1.52711	0.04367	-0.00007	0.00572	0.000	3.000	0.161	4
27	-1.4000	-1.53746	0.04381	-0.00006	0.00577	0.000	3.001	0.009	4
28	-1.3000	-1.33755	0.04402	-0.00010	0.00582	0.000	3.006	0.007	4
29	-1.2000	-1.24198	0.04426	-0.00013	0.00590	0.000	3.010	0.008	4
30	-1.1000	-1.15549	0.04459	-0.00018	0.00599	0.000	3.014	0.010	4
31	-1.0000	-1.04934	0.04508	-0.00025	0.00613	0.001	3.019	0.015	4
32	-0.9000	-0.95058	0.04571	-0.00035	0.00631	0.001	3.022	0.024	4
33	-0.8000	-0.85100	0.04657	-0.00045	0.00655	0.002	3.021	0.041	4
34	-0.7000	-0.74912	0.04764	-0.00051	0.00684	0.003	3.013	0.109	4
35	-0.6000	-0.64477	0.04884	-0.00056	0.00715	0.001	2.996	-0.124	1
36	-0.5000	-0.53785	0.04998	-0.00047	0.00742	0.002	2.972	-0.022	2
37	-0.4000	-0.42837	0.05079	-0.00025	0.00760	0.000	2.947	-0.003	2
38	-0.3000	-0.31956	0.05097	0.00009	0.00762	0.000	2.933	-0.000	2
39	-0.2000	-0.20861	0.05055	0.00048	0.00744	0.002	2.932	-0.004	2
40	-0.1000	-0.10126	0.04935	0.00081	0.00705	0.006	2.943	-0.012	1
41	0.0000	0.00781	0.04890	0.00107	0.00669	0.011	2.950	-0.063	1
42	0.1000	0.10126	0.04931	0.00132	0.00578	0.020	2.933	-0.078	1
43	0.2000	0.19378	0.04108	0.00171	0.00491	0.042	2.848	-0.075	1
44	0.3000	0.27810	0.03856	0.00203	0.00338	0.138	2.530	-0.083	1
45	0.4000	0.34973	0.02881	0.00198	0.00087	1.037	0.908	-4.318	1
(Success)									
46	-2.7000	-2.91489	0.05015	-0.00911	0.01223	0.659	4.862	0.333	4
47	-2.6000	-2.77769	0.04943	-0.01963	0.02267	0.701	5.588	-0.469	1
48	-2.51	-2.55822	0.03745	-0.03642	0.02847	0.825	5.919	-0.009	2
49	-2.4000	-2.31708	0.04344	0.01955	0.00550	0.401	2.631	-0.176	1
50	-2.3000	-2.26595	0.04579	0.01344	0.01607	0.466	4.571	1.446	6
51	-2.2000	-2.04038	0.04161	0.00413	0.00792	0.450	4.619	0.078	4
52	-2.1000	-1.95674	0.03709	0.00051	0.00497	0.006	3.612	0.005	7
53	-2.0000	-1.87168	0.03724	-0.00135	0.00435	0.004	3.135	0.011	7
54	-1.9000	-1.79432	0.03944	-0.00051	0.00443	0.007	3.001	-0.275	1
55	-1.8000	-1.71025	0.03731	-0.00055	0.00459	0.005	2.974	-0.054	1
56	-1.7000	-1.62312	0.04381	-0.00133	0.00495	0.004	2.933	-0.337	1
57	-1.6000	-1.53355	0.04168	-0.00017	0.00518	0.000	2.978	-0.029	1
58	-1.5000	-1.44541	0.04260	-0.00023	0.00536	0.001	2.984	-0.024	4
59	-1.4000	-1.35351	0.04297	-0.00074	0.00553	0.001	2.988	-0.020	4
60	-1.3000	-1.27302	0.04344	-0.00073	0.00564	0.000	2.991	-0.018	4
61	-1.2000	-1.18787	0.04342	-0.00115	0.00575	0.000	2.993	-0.016	4
62	-1.1000	-1.09744	0.04415	-0.00014	0.00584	0.000	2.995	-0.015	4
63	-1.0000	-1.07165	0.04442	-0.00017	0.00591	0.000	2.996	-0.014	4
64	-0.9000	-0.87525	0.04466	-0.00010	0.00596	0.000	2.997	-0.013	4
65	-0.8000	-0.77745	0.04488	-0.00007	0.00601	0.000	2.998	-0.013	4
66	-0.7000	-0.68120	0.04505	-0.00004	0.00604	0.000	2.998	-0.012	4
67	-0.6000	-0.58556	0.04521	-0.00007	0.00611	0.000	2.999	-0.011	4
68	-0.5000	-0.48558	0.04535	-0.00007	0.00617	0.000	2.999	-0.011	4
69	-0.4000	-0.38723	0.04551	-0.00006	0.00621	0.000	2.999	-0.010	4
70	-0.3000	-0.28831	0.04561	-0.00006	0.00624	0.000	2.999	-0.011	4
71	-0.2000	-0.18683	0.04575	-0.00005	0.00628	0.000	2.999	-0.010	4
72	-0.1000	-0.09079	0.04585	-0.00005	0.00630	0.000	2.999	-0.009	4
73	0.0000	0.00051	0.04595	-0.00004	0.00631	0.000	2.999	-0.008	4
74	0.1000	0.09783	0.04608	-0.00003	0.00633	0.000	2.999	-0.007	4
75	0.2000	0.19366	0.04618	-0.00003	0.00633	0.000	2.999	-0.002	4
76	0.3000	0.29746	0.04626	-0.00002	0.00639	0.000	2.999	-0.001	4
77	0.4000	0.40037	0.04635	-0.00002	0.00640	0.000	2.999	-0.001	4
78	0.5000	0.50335	0.04651	-0.00001	0.00641	0.000	2.998	-0.000	4
79	0.6000	0.60733	0.04670	0.00000	0.00641	0.000	2.998	-0.000	4
80	0.7000	0.70744	0.04683	0.00001	0.00641	0.000	2.998	-0.000	4
81	0.8000	0.81338	0.04691	0.00001	0.00643	0.000	2.998	-0.001	4
82	0.9000	0.90137	0.04693	0.00001	0.00644	0.000	2.998	-0.001	4
83	1.0000	1.00107	0.04699	0.00004	0.00645	0.000	2.998	-0.002	4
84	1.1000	1.10000	0.04708	0.00005	0.00646	0.000	2.998	-0.004	4
85	1.2000	1.20099	0.04696	0.00006	0.00641	0.000	2.997	-0.005	4
86	1.3000	1.29832	0.04672	0.00007	0.00626	0.000	2.997	-0.007	4
87	1.4000	1.40375	0.04655	0.00009	0.00622	0.000	2.996	-0.008	4
88	1.5000	1.50207	0.04674	0.00011	0.00618	0.000	2.995	-0.009	4
89	1.6000	1.59989	0.04649	0.00013	0.00609	0.000	2.994	-0.011	4
90	1.7000	1.69711	0.04619	0.00016	0.00591	0.001	2.992	-0.012	4
91	1.8000	1.79353	0.04611	0.00020	0.00589	0.000	2.988	-0.014	4
92	1.9000	1.89904	0.04598	0.00023	0.00574	0.001	2.981	-0.016	4
93	2.0000	1.98132	0.04320	0.00033	0.00554	0.002	2.969	-0.019	4
94	2.1000	2.07561	0.04225	0.00033	0.00528	0.004	2.946	-0.023	2
95	2.2000	2.16537	0.04382	0.00042	0.00482	0.013	2.895	-0.031	1
96	2.3000	2.25182	0.03854	0.00178	0.00410	0.032	2.787	-0.043	1
97	2.4000	2.33128	0.03650	0.00256	0.00275	0.157	2.313	-0.068	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 5

Subject	$\hat{\theta}$	Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.44395	0.02471	-0.00349	0.00144	0.464	1.626	-0.117	1
16	-2.5000	-2.41605	0.03517	-0.00179	0.00322	0.074	2.602	-0.056	1
17	-2.4000	-2.33350	0.03814	-0.00104	0.00413	0.020	2.836	-0.038	1
18	-2.3000	-2.24785	0.03994	-0.00066	0.00466	0.007	2.919	-0.028	1
19	-2.2000	-2.15813	0.04112	-0.00044	0.00499	0.003	2.955	-0.021	2
20	-2.1000	-2.06426	0.04197	-0.00031	0.00522	0.001	2.972	-0.017	2
21	-2.0000	-1.97691	0.04250	-0.00022	0.00538	0.001	2.982	-0.013	4
22	-1.9000	-1.88453	0.04291	-0.00017	0.00550	0.000	2.988	-0.010	4
23	-1.8000	-1.79132	0.04322	-0.00012	0.00559	0.000	2.991	-0.008	4
24	-1.7000	-1.69755	0.04345	-0.00009	0.00565	0.000	2.994	-0.006	4
25	-1.6000	-1.60318	0.04361	-0.00007	0.00570	0.000	2.995	-0.004	4
26	-1.5000	-1.50882	0.04376	-0.00005	0.00574	0.000	2.996	-0.003	4
27	-1.4000	-1.41404	0.04386	-0.00004	0.00577	0.000	2.997	-0.003	4
28	-1.3000	-1.31808	0.04393	-0.00003	0.00579	0.000	2.998	-0.002	4
29	-1.2000	-1.22391	0.04399	-0.00003	0.00580	0.000	2.999	-0.004	4
30	-1.1000	-1.12833	0.04405	-0.00002	0.00582	0.000	3.000	0.012	4
31	-1.0000	-1.03330	0.04410	-0.00003	0.00584	0.003	3.001	0.002	4
32	-0.9000	-0.93791	0.04417	-0.00004	0.00586	0.000	3.003	0.002	4
33	-0.8000	-0.84225	0.04427	-0.00005	0.00589	0.003	3.005	0.003	4
34	-0.7000	-0.74631	0.04442	-0.00008	0.00591	0.000	3.008	0.004	4
35	-0.6000	-0.65002	0.04463	-0.00012	0.00600	0.000	3.011	0.006	4
36	-0.5000	-0.55215	0.04495	-0.00017	0.00609	0.000	3.014	0.009	4
37	-0.4000	-0.45544	0.04540	-0.00024	0.00622	0.001	3.016	0.015	4
38	-0.3000	-0.35561	0.04603	-0.00032	0.00634	0.001	3.016	0.127	4
39	-0.2000	-0.25810	0.04676	-0.00034	0.00654	0.001	3.011	0.060	4
40	-0.1000	-0.15422	0.04762	-0.00041	0.00681	0.002	2.999	-0.169	1
41	0.0000	-0.05025	0.04846	-0.00038	0.00700	0.001	2.980	-0.019	4
42	0.1000	0.05528	0.04907	-0.00019	0.00712	0.000	2.956	-0.013	2
43	0.2000	0.16164	0.04914	0.00011	0.00709	0.000	2.937	-0.001	2
44	0.3000	0.26753	0.04854	0.00051	0.00686	0.002	2.917	-0.009	2
45	0.4000	0.37198	0.04692	0.00131	0.00638	0.010	2.888	-0.029	1
46	0.5000	0.48672	0.04414	0.00161	0.00550	0.030	2.825	-0.052	1
(Success)									
22	-1.9000	-2.14318	0.08121	-0.02016	0.02157	1.773	5.758	9.662	6
23	-1.8000	-1.94883	0.12775	-0.03034	0.03553	3.487	2.320	-0.156	1
24	-1.7000	-1.84414	0.13842	0.02248	0.01530	0.203	1.881	-0.062	1
25	-1.6000	-1.41793	0.07210	0.02531	0.07602	1.709	5.005	-1.865	1
26	-1.5000	-1.27424	0.10873	0.03872	0.01305	0.721	6.365	3.148	4
27	-1.4000	-1.22133	0.03358	0.00041	0.00465	0.004	4.132	0.002	7
28	-1.3000	-1.15420	0.07449	-0.00080	0.03375	0.019	3.151	1.358	4
29	-1.2000	-1.07736	0.03858	-0.00095	0.00195	0.019	2.958	-0.100	1
30	-1.1000	-0.99416	0.11865	-0.00074	0.00415	0.011	2.942	-0.056	1
31	-1.0000	-0.91124	0.03995	-0.00081	0.00471	0.006	2.954	-0.039	1
32	-0.9000	-0.82758	0.04113	-0.00047	0.00531	0.003	2.967	-0.031	1
33	-0.8000	-0.73367	0.04199	-0.00076	0.00525	0.003	2.976	-0.025	1
34	-0.7000	-0.64706	0.04268	-0.00074	0.00541	0.001	2.983	-0.021	1
35	-0.6000	-0.54912	0.04122	-0.00072	0.00558	0.001	2.988	-0.018	4
36	-0.5000	-0.45513	0.04388	-0.00014	0.00570	0.000	2.991	-0.015	4
37	-0.4000	-0.36328	0.04432	-0.00015	0.00580	0.000	2.993	-0.011	4
38	-0.3000	-0.26477	0.04431	-0.00012	0.00588	0.000	2.995	-0.012	4
39	-0.2000	-0.16961	0.04458	-0.00011	0.00595	0.000	2.996	-0.010	4
40	-0.1000	-0.07731	0.04478	-0.00009	0.00600	0.000	2.997	-0.009	4
41	0.0000	0.02499	0.04492	-0.00007	0.00605	0.000	2.997	-0.038	4
42	0.1000	0.12216	0.04507	-0.00006	0.00609	0.000	2.998	-0.006	4
43	0.2000	0.21587	0.04519	-0.00005	0.00612	0.000	2.998	-0.005	4
44	0.3000	0.31175	0.04529	-0.00036	0.00615	0.000	2.998	-0.004	4
45	0.4000	0.41597	0.04534	-0.00004	0.00617	0.000	2.998	-0.003	4
46	0.5000	0.51412	0.04545	-0.00003	0.00619	0.000	2.998	-0.002	4
47	0.6000	0.61755	0.04550	-0.00003	0.00621	0.003	2.998	-0.001	4
48	0.7000	0.71102	0.04554	-0.00001	0.00622	0.000	2.998	-0.000	4
49	0.8000	0.81556	0.04558	-0.00001	0.00623	0.000	2.998	-0.000	4
50	0.9000	0.90413	0.04557	0.00003	0.00623	0.000	2.998	-0.000	4
51	1.0000	1.00226	0.04555	-0.00001	0.00622	0.000	2.998	-0.000	4
52	1.1000	1.10522	0.04552	0.00002	0.00621	0.000	2.998	-0.001	4
53	1.2000	1.20765	0.04547	0.00003	0.00620	0.000	2.998	-0.001	4
54	1.3000	1.30195	0.04540	0.00004	0.00618	0.000	2.997	-0.002	4
55	1.4000	1.40205	0.04529	0.00006	0.00615	0.001	2.997	-0.003	4
56	1.5000	1.49788	0.04518	0.00007	0.00611	0.000	2.996	-0.005	4
57	1.6000	1.59559	0.04497	0.00010	0.00605	0.000	2.995	-0.006	4
58	1.7000	1.69742	0.04475	0.00011	0.00599	0.000	2.994	-0.008	4
59	1.8000	1.78488	0.04441	0.00017	0.00589	0.000	2.992	-0.010	4
60	1.9000	1.88650	0.04398	0.00025	0.00577	0.001	2.988	-0.011	4
61	2.0000	1.97705	0.04340	0.00032	0.00560	0.001	2.981	-0.016	4
62	2.1000	2.07338	0.04278	0.00047	0.00535	0.003	2.972	-0.021	2
63	2.2000	2.16288	0.04131	0.00071	0.00497	0.007	2.953	-0.027	2
64	2.3000	2.25027	0.03932	0.00117	0.00435	0.021	2.912	-0.038	1
65	2.4000	2.33198	0.03580	0.00217	0.00322	0.098	2.811	-0.059	1
66	2.5000	2.40727	0.02518	0.00448	0.00080	0.809	0.917	-0.362	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 6

Subject (Failure)	$\hat{\theta}$	Mean	Var.	3rd	4th	β_1	β_2	κ	Type
		Conditional Moments							
15	-2.6000	-2.49796	0.02934	-0.00436	0.00044	0.755	1.024	-0.268	1
16	-2.5000	-2.47674	0.03577	-0.00207	0.00121	0.094	2.508	-0.054	1
17	-2.4000	-2.34557	0.03811	-0.00114	0.00433	0.322	2.813	-0.337	1
18	-2.3000	-2.25446	0.04104	-0.00067	0.00491	0.007	2.912	-0.033	1
19	-2.2000	-2.16728	0.04276	-0.00045	0.00527	0.003	2.953	-0.020	1
20	-2.1000	-2.07594	0.04317	-0.00031	0.00551	0.001	2.972	-0.015	1
21	-2.0000	-1.98712	0.04361	-0.00022	0.00568	0.001	2.983	-0.012	1
22	-1.9000	-1.88726	0.04406	-0.00016	0.00583	0.000	2.989	-0.010	1
23	-1.8000	-1.79184	0.04435	-0.00012	0.00584	0.000	2.992	-0.008	4
24	-1.7000	-1.68545	0.04454	-0.00009	0.00595	0.000	2.994	-0.006	4
25	-1.6000	-1.59871	0.04475	-0.00007	0.00600	0.000	2.996	-0.005	4
26	-1.5000	-1.50184	0.04489	-0.00006	0.00604	0.000	2.997	-0.004	4
27	-1.4000	-1.40460	0.04500	-0.00004	0.00607	0.000	2.998	-0.003	4
28	-1.3000	-1.30718	0.04538	-0.00003	0.00609	0.000	2.998	-0.002	4
29	-1.2000	-1.20986	0.04515	-0.00003	0.00611	0.000	2.998	-0.002	4
30	-1.1000	-1.11183	0.04521	-0.00002	0.00613	0.000	2.999	-0.001	4
31	-1.0000	-1.01401	0.04523	-0.00001	0.00614	0.000	2.999	-0.001	4
32	-0.9000	-0.91611	0.04526	-0.00001	0.00614	0.000	2.999	-0.001	4
33	-0.8000	-0.81870	0.04528	-0.00000	0.00615	0.000	2.999	-0.000	4
34	-0.7000	-0.71024	0.04528	-0.00000	0.00615	0.000	2.999	-0.000	4
35	-0.6000	-0.62229	0.04524	0.00000	0.00615	0.000	2.999	-0.000	4
36	-0.5000	-0.52454	0.04527	0.00001	0.00615	0.000	2.999	-0.000	4
37	-0.4000	-0.42441	0.04525	0.00001	0.00614	0.000	2.999	-0.001	4
38	-0.3000	-0.32457	0.04522	0.00001	0.00613	0.000	2.999	-0.001	4
39	-0.2000	-0.23018	0.04518	0.00002	0.00612	0.000	2.999	-0.001	4
40	-0.1000	-0.13708	0.04514	0.00002	0.00611	0.000	2.998	-0.002	4
41	0.0000	-0.03549	0.04518	0.00003	0.00610	0.000	2.999	-0.003	4
42	0.1000	0.08161	0.04501	0.00003	0.00608	0.000	2.999	-0.003	4
43	0.2000	0.15926	0.04493	0.00004	0.00605	0.000	2.999	-0.004	4
44	0.3000	0.25633	0.04484	0.00005	0.00603	0.000	2.998	-0.005	4
45	0.4000	0.35725	0.04473	0.00006	0.00600	0.000	2.998	-0.006	4
46	0.5000	0.46547	0.04460	0.00007	0.00596	0.000	2.998	-0.008	4
47	0.6000	0.56618	0.04444	0.00008	0.00592	0.000	2.997	-0.009	4
48	0.7000	0.66714	0.04427	0.00009	0.00587	0.003	2.997	-0.011	4
49	0.8000	0.77770	0.04407	0.00010	0.00582	0.000	2.997	-0.015	4
50	0.9000	0.85779	0.04384	0.00011	0.00576	0.000	2.998	-0.023	4
51	1.0000	0.92337	0.04360	0.00011	0.00571	0.003	[illegible]	-0.198	1
52	1.1000	1.02143	0.04338	0.00011	0.00568	0.000	3.004	0.015	4
53	1.2000	1.11447	0.04315	0.00008	0.00561	0.003	3.011	0.002	4
54	1.3000	1.22417	0.04316	-0.00001	0.00562	0.000	3.033	0.000	7
55	1.4000	1.30145	0.04327	-0.00021	0.00578	0.001	3.071	0.007	7
56	1.5000	1.39876	0.04412	-0.00063	0.00611	0.005	3.126	0.113	7
57	1.6000	1.49139	0.04674	-0.00141	0.00699	0.020	3.220	0.040	4
58	1.7000	1.59715	0.05056	-0.00265	0.00832	0.055	3.254	0.121	4
59	1.8000	1.71381	0.05777	-0.00397	0.01019	0.080	3.115	-6.088	1
60	1.9000	1.86766	0.06246	-0.00744	0.01245	0.045	2.814	-0.069	1
61	2.0000	1.99921	0.07169	-0.00853	0.01367	0.001	2.826	-0.001	2
62	2.1000	2.15117	0.06642	0.00719	0.01251	0.032	2.749	-0.040	1
63	2.2000	2.29043	0.05598	0.00418	0.01111	0.341	3.159	-1.492	1
64	2.3000	2.41706	0.05192	0.00108	0.00874	0.087	3.257	0.161	4
65	2.4000	2.51793	0.04840	0.00167	0.00712	0.127	3.252	0.169	4
66	2.5000	2.61755	0.04421	0.00074	0.00610	0.008	3.162	0.018	7
67	2.6000	2.71234	0.04314	0.00025	0.00576	0.001	3.081	0.003	7

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 6 (Continued)

Subject (Success)	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
17	-2.6000	-2.51693	0.05160	-0.00239	0.00844	0.041	3.169	0.146	4
18	-2.5000	-2.39589	0.05776	-0.00310	0.01010	0.053	3.039	-0.525	1
19	-2.4000	-2.26868	0.06409	-0.00253	0.01161	0.024	2.827	-0.044	1
20	-2.3000	-2.12735	0.06725	-0.00018	0.01226	0.000	2.711	-0.000	2
21	-2.2000	-1.97589	0.06675	0.00253	0.01176	0.019	2.804	-0.033	1
22	-2.1000	-1.84682	0.05856	0.00410	0.01033	0.048	3.013	-0.341	1
23	-2.0000	-1.72655	0.05239	0.00247	0.00866	0.043	3.158	0.172	4
24	-1.9000	-1.61928	0.04907	0.00152	0.00734	0.021	3.176	0.055	4
25	-1.8000	-1.51732	0.04562	0.00079	0.00651	0.007	3.128	0.021	7
26	-1.7000	-1.42000	0.04443	0.00035	0.00607	0.001	3.076	0.007	7
27	-1.6000	-1.32568	0.04397	0.00011	0.00588	0.000	3.040	0.002	7
28	-1.5000	-1.23050	0.04384	-0.00001	0.00581	0.000	3.019	0.000	8
29	-1.4000	-1.13549	0.04384	-0.00007	0.00582	0.000	3.008	0.003	8
30	-1.3000	-1.03913	0.04415	-0.00009	0.00585	0.000	3.002	0.005	8
31	-1.2000	-0.94143	0.04435	-0.00009	0.00590	0.000	3.000	-0.012	1
32	-1.1000	-0.84727	0.04455	-0.00009	0.00595	0.000	2.998	-0.019	8
33	-1.0000	-0.75076	0.04473	-0.00008	0.00600	0.000	2.998	-0.012	8
34	-0.9000	-0.65276	0.04489	-0.00007	0.00604	0.000	2.998	-0.009	8
35	-0.8000	-0.55569	0.04501	-0.00006	0.00607	0.000	2.998	-0.007	8
36	-0.7000	-0.45993	0.04511	-0.00005	0.00611	0.000	2.998	-0.005	8
37	-0.6000	-0.36113	0.04520	-0.00004	0.00614	0.000	2.998	-0.004	8
38	-0.5000	-0.26513	0.04534	-0.00004	0.00616	0.000	2.998	-0.003	8
39	-0.4000	-0.16536	0.04551	-0.00003	0.00618	0.000	2.999	-0.002	8
40	-0.3000	-0.06866	0.04567	-0.00002	0.00620	0.000	2.999	-0.001	8
41	0.0000	0.03135	0.04581	-0.00002	0.00621	0.000	2.999	-0.001	8
42	0.1000	0.13023	0.04594	-0.00001	0.00622	0.000	2.999	-0.000	8
43	0.2000	0.22873	0.04606	-0.00001	0.00622	0.000	2.999	-0.000	8
44	0.3000	0.32734	0.04617	-0.00000	0.00623	0.000	2.999	-0.000	8
45	0.4000	0.42591	0.04627	0.00000	0.00623	0.000	2.999	-0.000	8
46	0.5000	0.52448	0.04636	0.00000	0.00622	0.000	2.999	-0.000	8
47	0.6000	0.62302	0.04644	0.00001	0.00622	0.000	2.999	-0.000	8
48	0.7000	0.72151	0.04651	0.00001	0.00621	0.000	2.999	-0.001	8
49	0.8000	0.81994	0.04658	0.00002	0.00620	0.000	2.999	-0.001	8
50	0.9000	0.91827	0.04663	0.00002	0.00619	0.000	2.999	-0.002	8
51	1.0000	1.01650	0.04668	0.00003	0.00617	0.000	2.999	-0.003	8
52	1.1000	1.11458	0.04671	0.00004	0.00615	0.000	2.998	-0.003	8
53	1.2000	1.21251	0.04672	0.00004	0.00613	0.000	2.998	-0.004	8
54	1.3000	1.31022	0.04672	0.00005	0.00610	0.000	2.998	-0.005	8
55	1.4000	1.40769	0.04669	0.00007	0.00607	0.001	2.997	-0.005	8
56	1.5000	1.50486	0.04663	0.00008	0.00602	0.000	2.996	-0.006	8
57	1.6000	1.60164	0.04653	0.00010	0.00597	0.001	2.994	-0.007	8
58	1.7000	1.69794	0.04638	0.00011	0.00589	0.000	2.992	-0.009	8
59	1.8000	1.79361	0.04619	0.00012	0.00580	0.000	2.988	-0.011	8
60	1.9000	1.88846	0.04596	0.00013	0.00567	0.001	2.982	-0.013	8
61	2.0000	1.98220	0.04501	0.00013	0.00550	0.001	2.974	-0.016	2
62	2.1000	2.07437	0.04215	0.00348	0.00524	0.003	2.949	-0.021	2
63	2.2000	2.16424	0.04085	0.00074	0.00486	0.008	2.904	-0.028	1
64	2.3000	2.25054	0.03876	0.00124	0.00419	0.026	2.790	-0.040	1
65	2.4000	2.33045	0.03511	0.00229	0.00298	0.120	2.421	-0.067	1
66	2.5000	2.39943	0.02782	0.00491	0.00033	1.122	0.428	0.234	4

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 7

Subject	$\hat{\theta}$	Conditional Moments: Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.50156	0.02965	-0.00442	0.00092	0.749	1.041	-0.259	1
16	-2.5000	-2.42928	0.03610	-0.00210	0.00331	0.092	2.515	-0.158	1
17	-2.4000	-2.34674	0.03969	-0.00116	0.00444	0.021	2.816	-0.037	1
18	-2.3000	-2.25858	0.04165	-0.00070	0.00505	0.007	2.913	-0.026	1
19	-2.2000	-2.16706	0.04288	-0.00045	0.00543	0.003	2.953	-0.019	2
20	-2.1000	-2.07337	0.04369	-0.00031	0.00567	0.001	2.972	-0.014	2
21	-2.0000	-1.97822	0.04425	-0.00021	0.00584	0.001	2.982	-0.011	9
22	-1.9000	-1.88205	0.04464	-0.00015	0.00595	0.000	2.988	-0.009	9
23	-1.8000	-1.78516	0.04492	-0.00011	0.00604	0.000	2.991	-0.005	6
24	-1.7000	-1.68776	0.04511	-0.00007	0.00609	0.000	2.994	-0.004	9
25	-1.6000	-1.59001	0.04525	-0.00005	0.00613	0.000	2.995	-0.002	6
26	-1.5000	-1.49202	0.04534	-0.00003	0.00616	0.000	2.996	-0.001	6
27	-1.4000	-1.39388	0.04539	-0.00002	0.00617	0.000	2.997	-0.000	6
28	-1.3000	-1.29566	0.04541	-0.00000	0.00618	0.000	2.998	-0.000	9
29	-1.2000	-1.19742	0.04541	0.00001	0.00618	0.000	2.998	-0.000	9
30	-1.1000	-1.09921	0.04539	0.00001	0.00618	0.000	2.998	-0.000	6
31	-1.0000	-1.00106	0.04535	0.00002	0.00617	0.000	2.998	-0.001	6
32	-0.9000	-0.90302	0.04529	0.00003	0.00615	0.000	2.999	-0.002	6
33	-0.8000	-0.80510	0.04522	0.00004	0.00613	0.000	2.999	-0.003	9
34	-0.7000	-0.70735	0.04514	0.00004	0.00611	0.000	2.998	-0.005	9
35	-0.6000	-0.60980	0.04505	0.00005	0.00608	0.000	2.998	-0.006	9
36	-0.5000	-0.51247	0.04493	0.00006	0.00605	0.000	2.998	-0.007	6
37	-0.4000	-0.41540	0.04480	0.00006	0.00602	0.000	2.998	-0.008	6
38	-0.3000	-0.31853	0.04465	0.00007	0.00598	0.000	2.998	-0.009	6
39	-0.2000	-0.22222	0.04448	0.00009	0.00593	0.000	2.997	-0.010	6
40	-0.1000	-0.12620	0.04428	0.00010	0.00588	0.000	2.996	-0.011	9
41	0.0000	-0.03065	0.04405	0.00012	0.00581	0.000	2.996	-0.013	6
42	0.1000	0.06416	0.04378	0.00014	0.00574	0.000	2.995	-0.015	6
43	0.2000	0.15872	0.04345	0.00016	0.00565	0.000	2.994	-0.018	6
44	0.3000	0.25233	0.04309	0.00019	0.00555	0.000	2.993	-0.022	6
45	0.4000	0.34507	0.04265	0.00021	0.00544	0.001	2.993	-0.033	1
46	0.5000	0.43680	0.04216	0.00023	0.00533	0.001	2.997	-0.067	1
47	0.6000	0.52745	0.04165	0.00023	0.00522	0.001	3.009	-0.035	4
48	0.7000	0.61737	0.04123	0.00014	0.00517	0.000	3.042	0.003	7
49	0.8000	0.70688	0.04117	-0.00014	0.00529	0.000	3.124	0.001	7
50	0.9000	0.79593	0.04216	-0.00089	0.00586	0.011	3.296	0.014	7
51	1.0000	0.88931	0.04573	-0.00362	0.00799	0.072	3.535	0.065	4
52	1.1000	0.99754	0.05452	-0.00570	0.01052	0.200	3.538	0.332	4
53	1.2000	1.13126	0.06998	-0.00801	0.01463	0.187	2.989	-0.252	1
54	1.3000	1.29957	0.08345	-0.00338	0.01703	0.019	2.416	-0.312	2
55	1.4000	1.48164	0.08099	0.00571	0.01662	0.061	2.534	-0.042	1
56	1.5000	1.66019	0.06489	0.00774	0.01345	0.219	3.196	-0.652	1
57	1.6000	1.76452	0.05120	0.00467	0.00941	0.163	3.591	0.186	4
58	1.7000	1.86873	0.04427	0.00147	0.00680	0.045	3.467	0.042	4
(Success)									
34	-0.7000	-0.74825	0.06918	-0.00282	0.00749	0.067	3.098	-11.373	1
35	-0.6000	-0.63496	0.05562	-0.00299	0.00913	0.052	2.949	-0.153	1
36	-0.5000	-0.50817	0.06120	-0.00190	0.01038	0.016	2.773	-0.024	2
37	-0.4000	-0.37297	0.06297	0.00035	0.01081	0.000	2.725	-0.001	2
38	-0.3000	-0.23924	0.05998	0.00220	0.01027	0.022	2.853	-0.047	1
39	-0.2000	-0.11521	0.05454	0.00259	0.00905	0.041	3.041	-0.737	1
40	-0.1000	-0.00291	0.04950	0.00199	0.00771	0.031	3.149	0.126	4
41	0.0000	0.10013	0.04604	0.00122	0.00668	0.015	3.153	0.044	4
42	0.1000	0.19759	0.04408	0.00064	0.00604	0.005	3.110	0.017	7
43	0.2000	0.29158	0.04313	0.00028	0.00570	0.001	3.066	0.006	7
44	0.3000	0.38439	0.04275	0.00008	0.00555	0.000	3.035	0.001	7
45	0.4000	0.47678	0.04269	-0.00001	0.00550	0.000	3.017	0.000	8
46	0.5000	0.56921	0.04278	-0.00006	0.00550	0.000	3.007	0.002	8
47	0.6000	0.66190	0.04292	-0.00007	0.00553	0.000	3.002	0.018	8
48	0.7000	0.75493	0.04309	-0.00007	0.00557	0.000	2.999	-0.022	8
49	0.8000	0.84831	0.04324	-0.00007	0.00560	0.000	2.998	-0.003	8
50	0.9000	0.94200	0.04337	-0.00006	0.00564	0.000	2.997	-0.005	8
51	1.0000	1.03594	0.04348	-0.00004	0.00566	0.000	2.997	-0.003	8
52	1.1000	1.13009	0.04356	-0.00003	0.00568	0.000	2.997	-0.001	8
53	1.2000	1.22437	0.04360	-0.00001	0.00570	0.000	2.996	-0.000	8
54	1.3000	1.31872	0.04362	0.00000	0.00570	0.000	2.996	-0.000	8
55	1.4000	1.41306	0.04359	0.00002	0.00569	0.000	2.996	-0.000	8
56	1.5000	1.50731	0.04353	0.00004	0.00568	0.000	2.995	-0.001	8
57	1.6000	1.60138	0.04343	0.00006	0.00565	0.000	2.994	-0.003	8
58	1.7000	1.69516	0.04326	0.00009	0.00560	0.000	2.992	-0.005	8
59	1.8000	1.78852	0.04303	0.00013	0.00554	0.000	2.990	-0.007	8
60	1.9000	1.88138	0.04271	0.00017	0.00545	0.000	2.986	-0.010	8
61	2.0000	1.97373	0.04227	0.00024	0.00532	0.001	2.979	-0.013	8
62	2.1000	2.06404	0.04165	0.00034	0.00515	0.002	2.968	-0.017	2
63	2.2000	2.15324	0.04077	0.00049	0.00490	0.004	2.947	-0.023	2
64	2.3000	2.24013	0.03946	0.00074	0.00452	0.009	2.904	-0.031	1
65	2.4000	2.32150	0.03744	0.00118	0.00393	0.026	2.801	-0.042	1
66	2.5000	2.40122	0.03566	0.00207	0.00289	0.108	2.490	-0.061	1
67	2.6000	2.49187	0.02770	0.00415	0.00078	0.812	1.015	-0.314	1

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 8

Sub- ject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
15	-2.6000	-2.49550	0.02591	-0.00614	0.00110	0.639	1.232	-0.174	1
16	-2.5000	-2.41764	0.03617	-0.00199	0.00333	0.084	2.544	-0.056	1
17	-2.4000	-2.34159	0.03981	-0.00113	0.00438	0.023	2.824	-0.037	1
18	-2.3000	-2.25418	0.04127	-0.00068	0.00497	0.008	2.917	-0.026	1
19	-2.2000	-2.16357	0.04246	-0.00044	0.00533	0.003	2.955	-0.020	2
20	-2.1000	-2.05976	0.04326	-0.00030	0.00556	0.001	2.974	-0.015	2
21	-2.0000	-1.97655	0.04381	-0.00022	0.00573	0.001	2.983	-0.012	*
22	-1.9000	-1.88131	0.04422	-0.00016	0.00585	0.003	2.989	-0.010	*
23	-1.8000	-1.78510	0.04451	-0.00012	0.00593	0.000	2.992	-0.008	*
24	-1.7000	-1.68971	0.04476	-0.00009	0.00603	0.003	2.995	-0.007	*
25	-1.6000	-1.59169	0.04494	-0.00007	0.00605	0.000	2.996	-0.006	*
26	-1.5000	-1.49436	0.04508	-0.00006	0.00609	0.000	2.997	-0.005	*
27	-1.4000	-1.39665	0.04520	-0.00005	0.00612	0.000	2.998	-0.004	*
28	-1.3000	-1.29877	0.04529	-0.00004	0.00615	0.000	2.998	-0.003	*
29	-1.2000	-1.20071	0.04536	-0.00003	0.00617	0.003	2.999	-0.003	*
30	-1.1000	-1.10253	0.04542	-0.00002	0.00619	0.000	2.998	-0.002	*
31	-1.0000	-1.00419	0.04547	-0.00002	0.00620	0.000	2.999	-0.002	*
32	-0.9000	-0.90578	0.04551	-0.00002	0.00621	0.000	2.999	-0.001	*
33	-0.8000	-0.80730	0.04554	-0.00001	0.00622	0.000	2.999	-0.001	*
34	-0.7000	-0.70875	0.04556	-0.00001	0.00623	0.003	2.998	-0.001	*
35	-0.6000	-0.61017	0.04558	-0.00001	0.00623	0.000	2.999	-0.000	*
36	-0.5000	-0.51155	0.04559	-0.00000	0.00623	0.000	3.000	-0.000	*
37	-0.4000	-0.41291	0.04560	-0.00000	0.00624	0.000	3.000	-0.000	*
38	-0.3000	-0.31426	0.04560	-0.00000	0.00624	0.003	3.000	-0.000	*
39	-0.2000	-0.21561	0.04560	0.00000	0.00624	0.003	3.000	-0.000	*
40	-0.1000	-0.11695	0.04560	0.00000	0.00624	0.000	3.000	-0.000	*
41	0.0000	-0.01831	0.04560	0.00000	0.00624	0.003	3.000	-0.000	*
42	0.1000	0.08032	0.04559	0.00000	0.00623	0.003	3.003	-0.000	*
43	0.2000	0.17894	0.04558	0.00000	0.00623	0.000	3.000	0.003	*
44	0.3000	0.27758	0.04557	0.00000	0.00623	0.000	3.000	0.000	*
45	0.4000	0.37612	0.04557	0.00000	0.00623	0.000	3.000	0.000	*
46	0.5000	0.47470	0.04557	-0.00000	0.00623	0.000	3.001	0.000	*
47	0.6000	0.57327	0.04557	-0.00000	0.00623	0.000	3.001	0.000	*
48	0.7000	0.67147	0.04558	-0.00001	0.00624	0.000	3.001	0.000	*
49	0.8000	0.77050	0.04561	-0.00002	0.00624	0.000	3.002	0.001	*
50	0.9000	0.86921	0.04565	-0.00003	0.00626	0.000	3.003	0.001	*
51	1.0000	0.96805	0.04572	-0.00004	0.00628	0.000	3.004	0.002	*
52	1.1000	1.06708	0.04583	-0.00006	0.00631	0.000	3.005	0.003	*
53	1.2000	1.16639	0.04599	-0.00009	0.00636	0.000	3.006	0.005	*
54	1.3000	1.26611	0.04621	-0.00012	0.00642	0.000	3.008	0.007	*
55	1.4000	1.36640	0.04651	-0.00016	0.00651	0.000	3.010	0.010	*
56	1.5000	1.46744	0.04691	-0.00021	0.00662	0.001	3.010	0.016	*
57	1.6000	1.56556	0.04741	-0.00026	0.00677	0.001	3.010	0.025	4
58	1.7000	1.67268	0.04802	-0.00033	0.00694	0.001	3.008	0.046	4
59	1.8000	1.77731	0.04877	-0.00033	0.00713	0.001	3.003	0.190	4
60	1.9000	1.88252	0.04955	-0.00033	0.00732	0.001	2.996	-0.064	1
61	2.0000	1.99125	0.05012	-0.00029	0.00750	0.001	2.987	-0.018	*
62	2.1000	2.10030	0.05065	-0.00019	0.00764	0.000	2.979	-0.005	*
63	2.2000	2.21022	0.05093	-0.00006	0.00771	0.000	2.974	-0.000	2
(Success)									
38	-0.3000	-0.25812	0.02994	-0.00516	0.00094	0.992	1.048	-0.486	1
39	-0.2000	-0.19517	0.02821	-0.00284	0.00378	0.189	2.590	-0.093	1
40	-0.1000	-0.09556	0.04118	-0.00201	0.00537	0.050	2.855	-0.088	1
41	0.0000	0.00761	0.04718	-0.00152	0.00656	0.022	2.906	-0.064	1
42	0.1000	0.11186	0.04994	-0.00102	0.00721	0.009	2.895	-0.028	1
43	0.2000	0.21783	0.05182	-0.00043	0.00768	0.001	2.896	-0.005	2
44	0.3000	0.32942	0.05181	0.00015	0.00781	0.000	2.910	-0.001	2
45	0.4000	0.44110	0.05100	0.00056	0.00766	0.002	2.947	-0.016	2
46	0.5000	0.55116	0.04954	0.00074	0.00736	0.004	2.988	-0.092	1
47	0.6000	0.65544	0.04794	0.00072	0.00694	0.005	3.018	0.154	4
48	0.7000	0.75756	0.04652	0.00059	0.00656	0.003	3.032	0.368	4
49	0.8000	0.85665	0.04541	0.00044	0.00625	0.002	3.033	0.025	4
50	0.9000	0.95428	0.04462	0.00030	0.00603	0.001	3.027	0.015	7
51	1.0000	1.05018	0.04408	0.00021	0.00587	0.003	3.020	0.039	*
52	1.1000	1.14512	0.04372	0.00013	0.00576	0.000	3.013	0.006	*
53	1.2000	1.23944	0.04349	0.00009	0.00569	0.000	3.008	0.005	*
54	1.3000	1.33338	0.04333	0.00007	0.00564	0.003	3.004	0.005	*
55	1.4000	1.42692	0.04320	0.00006	0.00560	0.000	3.001	0.024	*
56	1.5000	1.52324	0.04317	0.00006	0.00556	0.003	2.998	-0.039	*
57	1.6000	1.61327	0.04291	0.00007	0.00552	0.000	2.996	-0.006	*
58	1.7000	1.70558	0.04276	0.00009	0.00548	0.000	2.994	-0.006	*
59	1.8000	1.79826	0.04256	0.00012	0.00541	0.003	2.992	-0.008	*
60	1.9000	1.88999	0.04225	0.00015	0.00534	0.000	2.989	-0.010	*
61	2.0000	1.98130	0.04181	0.00020	0.00523	0.001	2.985	-0.013	*
62	2.1000	2.07136	0.04136	0.00022	0.00510	0.001	2.980	-0.018	*
63	2.2000	2.15862	0.04069	0.00035	0.00492	0.002	2.973	-0.023	2
64	2.3000	2.24632	0.03983	0.00047	0.00469	0.003	2.963	-0.331	1
65	2.4000	2.33152	0.03885	0.00061	0.00441	0.008	2.954	-0.063	1
66	2.5000	2.41387	0.03718	0.00075	0.00409	0.011	2.961	-0.376	1
67	2.6000	2.49284	0.03569	0.00077	0.00385	0.011	3.056	0.135	4
68	2.7000	2.56760	0.03427	0.00015	0.00415	0.001	3.536	0.000	7
69	2.8000	2.64288	0.03654	-0.00791	0.00871	0.185	5.029	0.044	4
70	2.9000	2.71563	0.05277	-0.01184	0.01599	1.310	5.761	0.448	4

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 9

Subject	$\hat{\theta}$	Mean	Var.	3rd	4th	β_1	β_2	κ	Type
		Conditional Moments							
(Failure)									
15	-2.6000	-2.49932	0.02861	-0.00474	0.00057	0.958	0.695	4.550	6
16	-2.5000	-2.47887	0.03510	-0.00222	0.00314	0.109	2.467	-0.061	1
17	-2.4000	-2.34736	0.03928	-0.00122	0.00432	0.025	2.802	-0.040	1
18	-2.3000	-2.25598	0.04134	-0.00074	0.00497	0.008	2.909	-0.028	1
19	-2.2000	-2.16904	0.04265	-0.00049	0.00537	0.003	2.952	-0.022	2
20	-2.1000	-2.07577	0.04353	-0.00034	0.00563	0.001	2.972	-0.017	2
21	-2.0000	-1.98090	0.04415	-0.00024	0.00581	0.001	2.982	-0.014	8
22	-1.9000	-1.88687	0.04461	-0.00018	0.00595	0.000	2.988	-0.011	8
23	-1.8000	-1.78798	0.04495	-0.00014	0.00605	0.000	2.992	-0.009	8
24	-1.7000	-1.69053	0.04522	-0.00011	0.00612	0.000	2.994	-0.008	8
25	-1.6000	-1.59236	0.04543	-0.00009	0.00618	0.000	2.995	-0.006	8
26	-1.5000	-1.49389	0.04560	-0.00007	0.00623	0.000	2.996	-0.005	8
27	-1.4000	-1.39511	0.04573	-0.00005	0.00627	0.000	2.997	-0.004	8
28	-1.3000	-1.29608	0.04583	-0.00004	0.00629	0.000	2.998	-0.003	8
29	-1.2000	-1.19685	0.04590	-0.00003	0.00632	0.000	2.998	-0.002	8
30	-1.1000	-1.09749	0.04596	-0.00002	0.00633	0.000	2.998	-0.001	8
31	-1.0000	-0.99803	0.04599	-0.00001	0.00634	0.000	2.998	-0.000	8
32	-0.9000	-0.89851	0.04601	-0.00001	0.00635	0.000	2.999	-0.000	8
33	-0.8000	-0.79896	0.04602	0.00000	0.00635	0.000	2.999	-0.000	8
34	-0.7000	-0.69942	0.04601	0.00001	0.00635	0.000	2.999	-0.000	8
35	-0.6000	-0.59989	0.04599	0.00001	0.00634	0.000	2.999	-0.000	8
36	-0.5000	-0.50042	0.04597	0.00001	0.00634	0.000	2.999	-0.001	8
37	-0.4000	-0.40101	0.04593	0.00002	0.00633	0.000	2.999	-0.002	8
38	-0.3000	-0.30169	0.04589	0.00002	0.00632	0.000	2.999	-0.003	8
39	-0.2000	-0.20247	0.04584	0.00002	0.00630	0.000	2.999	-0.004	8
40	-0.1000	-0.10336	0.04578	0.00003	0.00629	0.000	2.999	-0.005	8
41	0.0000	-0.00438	0.04572	0.00003	0.00627	0.000	2.999	-0.006	8
42	0.1000	0.09445	0.04565	0.00003	0.00625	0.000	2.999	-0.006	8
43	0.2000	0.19313	0.04558	0.00004	0.00623	0.000	2.999	-0.007	8
44	0.3000	0.29165	0.04549	0.00004	0.00621	0.000	2.999	-0.007	8
45	0.4000	0.39598	0.04540	0.00004	0.00618	0.000	2.999	-0.007	8
46	0.5000	0.48808	0.04530	0.00005	0.00615	0.000	2.999	-0.008	8
47	0.6000	0.58597	0.04519	0.00006	0.00612	0.000	2.998	-0.008	8
48	0.7000	0.68359	0.04506	0.00006	0.00609	0.000	2.998	-0.008	8
49	0.8000	0.78092	0.04492	0.00007	0.00605	0.000	2.997	-0.008	8
50	0.9000	0.87792	0.04475	0.00008	0.00600	0.000	2.997	-0.009	8
51	1.0000	0.97451	0.04455	0.00010	0.00594	0.000	2.996	-0.010	8
52	1.1000	1.07063	0.04431	0.00012	0.00588	0.000	2.994	-0.011	8
53	1.2000	1.16617	0.04401	0.00015	0.00579	0.000	2.992	-0.012	8
54	1.3000	1.26099	0.04364	0.00019	0.00569	0.000	2.988	-0.014	8
55	1.4000	1.35490	0.04316	0.00025	0.00556	0.001	2.982	-0.016	8
56	1.5000	1.44762	0.04252	0.00034	0.00537	0.002	2.972	-0.019	2
57	1.6000	1.53873	0.04165	0.00048	0.00512	0.003	2.954	-0.023	2
58	1.7000	1.62755	0.04037	0.00071	0.00476	0.008	2.916	-0.030	1
59	1.8000	1.71301	0.03846	0.00112	0.00418	0.022	2.826	-0.040	1
60	1.9000	1.79310	0.03528	0.00193	0.00317	0.095	2.562	-0.058	1
61	2.0000	1.86376	0.02935	0.00344	0.00120	0.585	1.393	-0.149	1
(Success)									
47	0.6000	0.79253	0.01625	0.00448	0.00088	4.681	3.328	4.794	6
48	0.7000	0.71953	0.01129	-0.00189	0.01253	10.496	98.317	3.468	4
49	0.8000	0.85345	0.06861	-0.09501	0.10376	12.514	12.903	-3.172	1
50	0.9000	0.87967	0.22251	0.22243	0.08251	9.315	3.793	-3.134	2
51	1.0000	1.31747	0.07256	0.08010	0.09069	16.799	17.227	-4.230	1
52	1.1000	1.37835	0.01033	0.00189	0.00990	3.242	92.680	0.121	4
53	1.2000	1.40522	0.01649	-0.00438	0.00069	4.278	2.544	0.899	4
54	1.3000	1.45363	0.02485	-0.00119	0.00121	0.665	1.956	-0.172	1
55	1.4000	1.51066	0.03060	-0.00201	0.00234	0.144	2.527	-0.087	1
56	1.5000	1.58368	0.03208	-0.00126	0.00317	0.041	2.764	-0.052	1
57	1.6000	1.65632	0.03606	-0.00079	0.00373	0.013	2.867	-0.033	1
58	1.7000	1.73593	0.03767	-0.00048	0.00408	0.004	2.916	-0.018	2
59	1.8000	1.81761	0.03821	-0.00028	0.00429	0.001	2.940	-0.007	2
60	1.9000	1.93195	0.03859	-0.00019	0.00443	0.003	2.953	-0.001	2
61	2.0000	1.98453	0.03863	0.00005	0.00442	0.003	2.960	-0.000	2
62	2.1000	2.08390	0.03850	0.00016	0.00438	0.000	2.963	-0.005	2
63	2.2000	2.17852	0.03798	0.00025	0.00430	0.001	2.985	-0.025	1
64	2.3000	2.27707	0.03761	0.00022	0.00426	0.001	3.044	0.008	7
65	2.4000	2.31764	0.03723	-0.00014	0.00447	0.000	3.224	0.001	7
66	2.5000	2.39427	0.03867	-0.00144	0.00569	0.116	3.612	0.322	7
67	2.6000	2.48358	0.04518	-0.00510	0.00862	0.287	4.220	0.142	4
68	2.7000	2.59809	0.06714	-0.01183	0.01506	0.555	3.173	-3.980	1
69	2.8000	2.76541	0.09215	-0.01232	0.02074	0.185	2.452	-0.090	1
70	2.9000	2.98108	0.16014	0.00604	0.02148	0.036	2.140	-0.016	2

TABLE A-2-1: Four Estimated Conditional Moments of θ, Together with the Coefficients β_1 and β_2, and Pearson's criterion κ (Continued)

DEGREE 5 CASE: Item 10

Subject	$\hat{\theta}$	Conditional Moments Mean	Var.	3rd	4th	β_1	β_2	κ	Type
(Failure)									
17	-2.6000	-2.49697	0.02985	-0.00417	0.00108	0.653	1.210	-0.181	1
18	-2.5000	-2.43469	0.03614	-0.00201	0.00332	0.086	2.539	-0.056	1
17	-2.4000	-2.34260	0.03939	-0.00112	0.00438	0.020	2.823	-0.037	1
18	-2.3000	-2.25514	0.04129	-0.00069	0.00497	0.007	2.916	-0.027	1
19	-2.2000	-2.16441	0.04250	-0.00045	0.00534	0.003	2.955	-0.020	2
20	-2.1000	-2.07154	0.04331	-0.00031	0.00558	0.001	2.973	-0.016	2
21	-2.0000	-1.97718	0.04389	-0.00023	0.00575	0.001	2.983	-0.013	8
22	-1.9000	-1.88176	0.04431	-0.00017	0.00587	0.000	2.989	-0.011	8
23	-1.8000	-1.78553	0.04463	-0.00013	0.00596	0.000	2.992	-0.009	8
24	-1.7000	-1.68869	0.04488	-0.00010	0.00603	0.000	2.995	-0.008	8
25	-1.6000	-1.59137	0.04509	-0.00008	0.00609	0.000	2.996	-0.007	8
26	-1.5000	-1.49365	0.04525	-0.00007	0.00614	0.000	2.997	-0.006	8
27	-1.4000	-1.39561	0.04539	-0.00006	0.00618	0.000	2.998	-0.006	8
28	-1.3000	-1.29729	0.04550	-0.00005	0.00621	0.000	2.998	-0.005	8
29	-1.2000	-1.19875	0.04560	-0.00004	0.00623	0.000	2.999	-0.005	8
30	-1.1000	-1.10001	0.04568	-0.00004	0.00626	0.000	2.999	-0.005	8
31	-1.0000	-1.00111	0.04576	-0.00003	0.00628	0.000	2.999	-0.004	8
32	-0.9000	-0.90205	0.04582	-0.00003	0.00630	0.000	2.999	-0.004	8
33	-0.8000	-0.80286	0.04588	-0.00002	0.00631	0.000	2.999	-0.003	8
34	-0.7000	-0.70355	0.04593	-0.00002	0.00633	0.000	2.999	-0.003	8
35	-0.6000	-0.60415	0.04597	-0.00002	0.00634	0.000	2.999	-0.002	8
36	-0.5000	-0.50466	0.04601	-0.00002	0.00635	0.000	2.999	-0.002	8
37	-0.4000	-0.40509	0.04604	-0.00001	0.00636	0.000	2.999	-0.001	8
38	-0.3000	-0.30545	0.04607	-0.00001	0.00637	0.000	2.999	-0.001	8
39	-0.2000	-0.20577	0.04609	-0.00001	0.00637	0.000	2.999	-0.000	8
40	-0.1000	-0.10605	0.04610	-0.00001	0.00638	0.000	2.999	-0.000	8
41	0.0000	-0.00630	0.04611	-0.00000	0.00638	0.000	2.999	-0.000	8
42	0.1000	0.09347	0.04612	-0.00000	0.00638	0.000	2.999	-0.000	8
43	0.2000	0.19373	0.04611	0.00000	0.00638	0.000	2.999	-0.000	8
44	0.3000	0.29399	0.04611	0.00001	0.00638	0.000	2.999	-0.000	8
45	0.4000	0.39427	0.04609	0.00001	0.00637	0.000	2.999	-0.000	8
46	0.5000	0.49459	0.04606	0.00001	0.00636	0.000	2.999	-0.001	8
47	0.6000	0.59501	0.04603	0.00002	0.00635	0.000	2.999	-0.001	8
48	0.7000	0.69554	0.04599	0.00002	0.00634	0.000	2.999	-0.002	8
49	0.8000	0.79598	0.04594	0.00003	0.00631	0.000	2.999	-0.002	8
50	0.9000	0.89629	0.04587	0.00003	0.00631	0.000	2.999	-0.003	8
51	1.0000	0.99644	0.04580	0.00004	0.00629	0.000	2.998	-0.004	8
52	1.1000	1.09642	0.04570	0.00005	0.00626	0.000	2.998	-0.004	8
53	1.2000	1.19718	0.04559	0.00006	0.00623	0.000	2.998	-0.005	8
54	1.3000	1.28567	0.04546	0.00007	0.00619	0.000	2.997	-0.006	8
55	1.4000	1.38384	0.04530	0.00008	0.00615	0.000	2.996	-0.007	8
56	1.5000	1.48162	0.04510	0.00010	0.00609	0.000	2.995	-0.008	8
57	1.6000	1.57892	0.04484	0.00013	0.00602	0.000	2.993	-0.009	8
58	1.7000	1.67540	0.04452	0.00017	0.00593	0.000	2.989	-0.011	8
59	1.8000	1.77148	0.04410	0.00022	0.00580	0.001	2.984	-0.013	8
60	1.9000	1.86610	0.04353	0.00031	0.00564	0.001	2.975	-0.016	2
61	2.0000	1.95965	0.04273	0.00044	0.00540	0.002	2.957	-0.020	2
62	2.1000	2.05091	0.04156	0.00066	0.00505	0.006	2.921	-0.026	1
63	2.2000	2.13898	0.03972	0.00108	0.00447	0.018	2.835	-0.036	1
64	2.3000	2.22179	0.03659	0.00192	0.00345	0.075	2.578	-0.054	1
65	2.4000	2.29516	0.03059	0.00394	0.00133	0.542	1.420	-0.136	1
(Success)									
44	0.3000	0.11887	0.04561	-0.00263	0.00733	0.073	3.523	0.068	4
45	0.4000	0.21580	0.04431	-0.00557	0.01035	0.194	3.507	0.352	4
46	0.5000	0.34857	0.04522	-0.00763	0.01424	0.176	2.971	-0.226	1
47	0.6000	0.51433	0.04240	-0.00314	0.01648	0.018	2.428	-0.011	2
48	0.7000	0.69293	0.03555	0.00539	0.01610	0.058	2.544	-0.041	1
49	0.8000	0.84925	0.02627	0.00739	0.01312	0.206	3.177	-0.615	1
50	0.9000	0.97790	0.05110	0.00454	0.00930	0.155	3.563	0.182	4
51	1.0000	1.07539	0.04433	0.00193	0.00679	0.043	3.457	0.062	4
52	1.1000	1.16775	0.04181	0.00057	0.00566	0.004	3.235	0.007	7
53	1.2000	1.25744	0.04132	-0.00002	0.00524	0.000	3.096	0.000	7
54	1.3000	1.34708	0.04164	-0.00024	0.00526	0.001	3.032	0.010	7
55	1.4000	1.43780	0.04225	-0.00030	0.00536	0.001	3.005	0.128	4
56	1.5000	1.52991	0.04291	-0.00030	0.00551	0.001	2.994	-0.055	1
57	1.6000	1.62341	0.04352	-0.00026	0.00566	0.001	2.988	-0.023	8
58	1.7000	1.71813	0.04412	-0.00021	0.00578	0.000	2.983	-0.010	8
59	1.8000	1.81377	0.04437	-0.00011	0.00586	0.000	2.977	-0.002	8
60	1.9000	1.90996	0.04451	-0.00003	0.00588	0.000	2.970	-0.000	2
61	2.0000	2.00611	0.04435	0.00015	0.00582	0.000	2.960	-0.002	2
62	2.1000	2.10158	0.04383	0.00034	0.00566	0.001	2.944	-0.009	2
63	2.2000	2.19543	0.04280	0.00063	0.00534	0.005	2.913	-0.020	2
64	2.3000	2.28622	0.04100	0.00104	0.00477	0.017	2.838	-0.034	1
65	2.4000	2.37185	0.03786	0.00192	0.00375	0.068	2.614	-0.056	1
66	2.5000	2.44809	0.03196	0.00385	0.00167	0.455	1.635	-0.115	1

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